UNIVERSITY OF MICHIGAN
NOV 6 1953
ENGINEERING LIBRARY

OCTOBER 31, 1953

Vol. 145 — No. 18

MANAGEMENT • PLANT • TRAFFIC • COMMERCIAL • LEGAL • ACCOUNTING •

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

Published every week on Saturday by TELEPHONY PUBLISHING CORPORATION, 608 South Dearborn Street, Chicago 5, Illinois. Subscription $3.50 per year. Entered as second class matter at the Post Office at Chicago, Illinois, under the act of March 3, 1879.

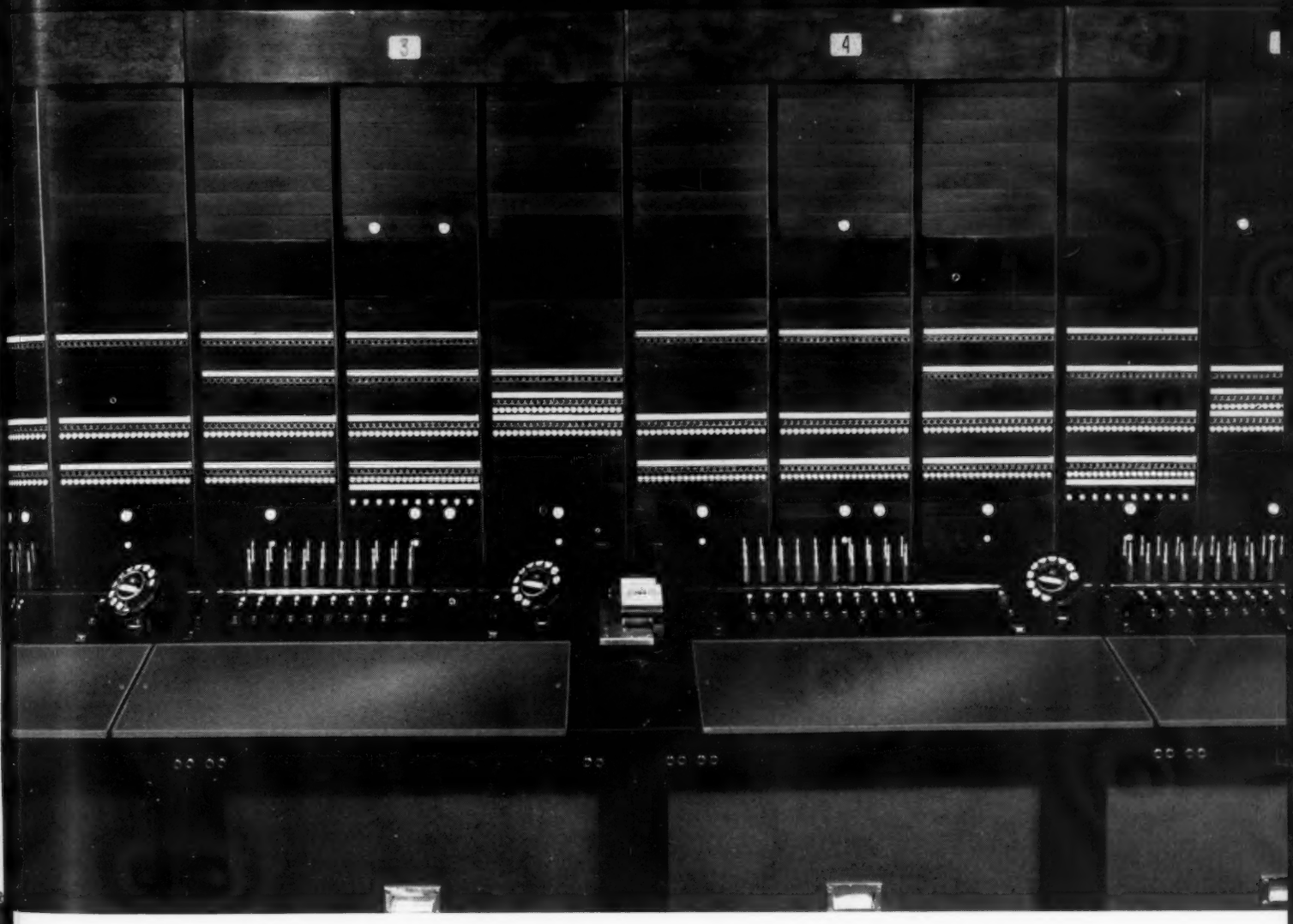
Guaranteed Circulation This Issue

9878, of Which 9385 Is Paid

How to pick up extra revenue that makes sense to you and your subscribers alike

New Stromberg

For complete specifications and circuit information, write for a free copy of Bulletin T-117.



LINE and TRUNK FEATURES

- Two-way ring-down toll with or without TX and night transfer.
- Two-way dial office trunks (Loop—CX—SX signaling).
- Common Battery Subscribers lines for direct toll service.
- Outgoing inter-toll trunks.
- Outgoing trunks to local office toll train selectors.
- Outgoing trunks to local office local selectors.
- Outgoing trunks to line switch.
- Outgoing trunks to rate and route desk.
- Outgoing trunks to information desk.
- Outgoing trunks to verification test distributor.
- Incoming local CLR recording trunk.
- Incoming local CLR recording trunk for coin lines.
- Incoming T-X operator trunks.
- Two-way trunk to Test Board.
- Two-way trunk to Repair Desk.
- Night information trunks.
- Night intercept trunks.
- Night rate and route trunks.
- Night repair service trunks.
- Inter-position trunks.

Write or call Kellogg for engineering counsel and assistance. Your inquiry will get a prompt and helpful response . . . without obligation.

KELLOGG DIVISION OF IT&T

KELLOGG SWITCHBOARD AND SUPPLY COMPANY

A Division of International Telephone and Telegraph Corporation

Sales Offices: 79 West Monroe Street, Chicago 3, Illinois

KELLOGG SWITCHBOARD AND SUPPLY COMPANY
Sales Offices: 79 W. Monroe St., Chicago 3, Ill.

Please send particulars regarding No. 3 Toll Switchboard.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE___ STATE_____

FLASHES AND PLUGS

FREEDOM OF SPEECH. A Los Angeles, Cal., woman says she recently made the mistake of asking her sister in a telephone call to Bucharest, Romania, if she would like to come to the United States.

"Oh, yes, yes," the sister, a physician, was quoted as replying.

The Californian said the conversation was immediately cut off, indicating it was being monitored.

It was the first time the woman had been able to converse with her sister in years, and now she fears for the sister's safety.

About four years ago, the woman added, she got a telephone call through to her brother in Odessa, Russia. She hasn't heard from him since.

• • •

PROBLEM. A resident of Charlotte, N. C., stepped on the gas and let 'er rip through the city's business district.

People ran for their lives. Three cars, one pedestrian and a telephone pole didn't quite make it and were hit by the plunging automobile.

Finally captured, the driver said: "I don't know why I done it."

The judge gave him three years in prison to figure it out.

• • •

NEVER, NEVER LAND. A six-year old asked, "Mother, why doesn't Aunt Helen come to see us?"

"She lives too far away, dear."

"Then why doesn't she telephone?"

"She has no telephone."

"Well, then," returned the child, "why doesn't she use ours?"

• • •

SEMPER FIDELIS. A Chicagoan recently pleaded in the city's Superior Court for a six-month jail sentence to escape the attentions of his ex-wife who wanted to remarry him.

The man asked the judge for the term "so I can get some peace and quiet" from the woman who divorced him last April.

He said his ex-wife lost interest in him after the divorce until he began courting another woman.

Then she began wooing him. She called him at all hours of the night and two or three times daily at his office.

Finally, his "ex" threatened to break up his car unless he agreed to remarry her. He wouldn't and she did, the man said, causing $400 damage.

The judge declined the plea for a jail sentence. But he issued an injunction restraining the woman from molesting her former husband.

The judge told the grass-widower: "If she violates this injunction you will have at least six months peace and quiet because she will go to jail for that length of time."

CIRCULATION

Guaranteed circulation of this issue is 9,878, of which 9,385, or 95 per cent, is paid.

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

October 31, 1953

Contents

IN THE NATION'S CAPITAL 13
By Francis X. Welch

SPECIAL AGENT 15
By Claude P. Peters

PRINCIPLES OF MICROWAVE OPERATION—Part I 16
By Harold B. McKay

OHIO OPEN HOUSE—DOOR TO GOOD PUBLIC RELATIONS 20
By Dan Fargo

THE PLANT MAN'S NOTEBOOK 22
By Ray Blain

PLANT MAN'S QUIZ 23
By Ray Blain

PIONEER MEETING HIGHLIGHTS USITA CONVENTION 26
By R. C. Reno

PUBLIC RELATIONS IN SPOTLIGHT AT ROCKY MOUNTAIN MEETING 28
By J. W. Baker

COURTS AND COMMISSIONS 30

HELPFUL LITERATURE 41

H. D. FARGO Jr., *President & Advertising Manager*
R. C. RENO, *Vice President & Editor*
H. D. FARGO, *Vice President & Treasurer*
A. J. STULTS, *Secretary & Western Manager*
DAN FARGO, *Managing Editor*
GEORGIA LEARNED, *Associate Editor*
RAY BLAIN, *Technical Editor*
FRANCIS X. WELCH, *Washington Editor*
MAYME WORKMAN, *Traffic Editor*
VIVIAN RYDEN, *Circulation Manager*

Published by

TELEPHONY PUBLISHING CORP.

Vol. 145, No. 18. Published every week on Saturday by TELEPHONY PUBLISHING CORPORATION, 608 South Dearborn St., Chicago (5), Ill. 20 cents per copy (except special issues). Subscription $3.50 per year U. S. and Countries in U. S. Spanish Postal Zone; $4.50 Canada; $5.50 Other Countries. Entered as second class matter at the Post Office at Chicago Ill., under the Act of March 3, 1879.

Telephone WA bash 2-2435

608 S. Dearborn St., Chicago (5), Ill.

U. S. A.

★ ★ ★ IN THE ★ ★ ★ NATION'S CAPITAL

by FRANCIS X. WELCH — WASHINGTON EDITOR

Discusses REA's recently modified policies. Reports Clarence Manion says TVA should be sold. . . . Ike's answer. What happened to NPA? FCC members see TV industry's 'compatible tube.' Commissioner Hyde says television color standards may be approved by Christmas.

GETTING THE government out of business is a great deal more difficult than getting the government into business. That is a truth which all utilities, including telephone companies, must bear in mind during these days of socialistic propaganda and economic unrest.

Right now the government is in the electric power business to the extent of about one-fifth of the nation's entire generating capacity (for public sale, that is). So far, the government, as such, has not attempted to go into the telephone business as a commercial competitor with private telephone companies. There has been, as we all are well aware, considerable uneasiness over the government's encouragement of non-profit, tax-exempt cooperatives to enter the field, via REA financing, in competition with established companies. But the recent moderate policies of REA in Washington have tended to allay earlier fears that the REA would be used as a Trojan Horse to infiltrate the rural areas with the seeds of socialism.

Be that as it may, there is a great difference between blocking public ownership before it gets started and getting rid of it once it has been well established. The Eisenhower Administration is confronted with both problems. The Eisenhower Administration is supposed to be at least sympathetic with business. Ike has campaigned and has frequently given voice to sentiments in favor of private enterprise.

With respect to public ownership tendencies not yet translated into concrete action, the Eisenhower Administration has been faithful to its pledge. We have, within a few months, witnessed the moderation of REA telephone loan policy, already mentioned—along the fair and square lines so clearly outlined by REA Administrator Nelsen at the recent USITA convention in Chicago. In the electric power field, there has been noted similar efforts by REA to return REA loan policies to the original intent of Congress. The Interior Department has come out, four square, against the use of the sale of wholesale power supply from Federal projects as an ax to kill off the business-managed taxpaying electric utilities and to promote a federal power supply monopoly in the West.

But the Tennessee Valley Authority (TVA) is something else again. There is a vast federal power supply system, completely monopolistic within its own Tennessee Valley service area, well established for more than 15 years. It has become a powerful political institution in that area. When President Eisenhower spoke of TVA as being "creeping socialism," the people in that region were as shocked as if the chief executive had said something positively sacrilegious. Governor Clement (Democrat) of Tennessee made a pilgrimage to Washington to straighten out the President's thinking on the subject. And Senator Kefauver (D., Tenn.) and other public-power bloc congressmen have been crying "shame," and beating their breasts for the edification of the local voters, ever since.

Manion Speaks Up

The foregoing is all by way of preface to an account of the latest ruckus in Washington which has stirred the already troubled waters for the Eisenhower Administration. Many readers of this department will readily recall the eloquent address given at the recent USITA convention in Chicago by Clarence Manion, former dean of Notre Dame Law School. This is the same Dean Manion (as he is still respectfully known in legal circles) who heads Eisenhower's Commission on Intergovernment Relations. This is a special fact-finding commission, set up to examine the proper relationship between state and federal governments. It is supposed to find out how far these relations have drifted out of line, and what should be done about them.

Well, last week Dean Manion went on a nation-wide TV panel show, entitled "The Issue." He was needled by the Washington editor of a Socialist magazine (once edited by Henry Wallace) to give his viewpoint on what the government should do about TVA. Being an honest and forthright man, Dean Manion made no bones about his reply. He said the government should sell TVA and never should have built it in the first place! That tore it. The fat has been in the fire ever since, as far as the Eisenhower Administration is concerned.

Angry left wing lobbies have been buzzing like hornets. The Americans for Democratic Action demanded that Manion resign. A new thing, known as the National Issues Committee (which professes to be non-partisan, but seems to be composed mostly of former upper case liberal federal officials) predicted that this would be the big issue of the 1954 Congressional campaign! Head of this "non-partisan group" is Mrs. Eleanor Roosevelt who was *most unhappy* about the suggestion of selling TVA!

Anyhow, when President Eisenhower met with the press reporters for his regular news conference last week, they were all loaded for bear. Did the President agree with Manion? Was there any plan to sell TVA back to private enterprise? So on and on. The President seemed to be surprised at all this concentration, on a minor point, at a time when so much more weighty international and domestic matters were in the news. But he had to do the political thing.

The President frowned on Manion's off-the-cuff suggestions. Said they were "pretty drastic"; said he did not see

REA APPROVES FIVE RURAL TELEPHONE LOANS FOR NORTH DAKOTA CO-OPS

The Rural Electrification Administration approved five telephone loans during the week of October 12 to 16.

United Telephone Mutual Aid Corp. of Devils Lake, N. D., received $411,000, to finance the improvement and extension of telephone service in rural areas of Cavalier County.

The newly-formed cooperative proposes to acquire from the North Dakota Telephone Co., the Langdon exchange providing service to 496 subscribers over 93 miles of line from a common battery switchboard, and operator service to 12 families who own their own lines and telephones.

The loan funds will also be used to build 177 miles of new line, rebuild 54 miles of the acquired line and to construct new dial central office facilities at Langdon. The rehabilitation and extension will enable United Telephone to bring new and improved telephone service to 727 subscribers including 231 now without telephones. The 12 subscribers owning their own lines will continue to receive central office service from the new cooperative. The completed system will consist of 252 miles of line.

* * * *

BEK Telephone Mutual Aid Corp. of Steele, N. D., was granted $371,000, to finance the improvement and extension of rural telephone service in Emmons County.

The new cooperative proposes to acquire the Hazelton exchange from the North Dakota Telephone Co., and the Kintyre South Line. These facilities are now furnishing service to 136 subscribers over 74 miles of line.

With these properties as a nucleus, the borrower also plans to build 276 miles of new line, rebuild 52 miles of the acquired line and construct new dial central offices at Hazelton and Kintyre.

The improvements and the extension possible under this loan will bring new and improved telephone service to 529 rural subscribers of whom 393 have no service now. The borrower is contemplating service without toll charge between the two exchange areas. Completed, the new system will consist of 340 miles of line.

* * * *

Polar Rural Telephone Mutual Aid Corp. of Petersburg, N. D., received $2,309,000, to finance the improvement and extension of rural telephone service in Cass, Grand Forks, Nelson, Pembina and Walsh counties in North Dakota, and a small portion of Marshall County, Minnesota.

Nucleus of the proposed system will be the following acquisitions: The Flem Telephone Co.; facilities in and near Hunter, from the Hunter Telephone Co.; two subscriber-owned lines; and the Bowesmont, Cavalier, Crystal, Drayton, Bathgate, Hoople, Michigan, Neche, Park River and St. Thomas exchanges from the North Dakota Telephone Co. These properties are now providing dial and magneto service to 2,769 subscribers over 921 miles of line.

The loan funds will be used to rebuild 754 miles of the acquired line, and build 712 miles of new line. Dial central offices for the system will be located at Bowesmont, Cavalier, Crystal, Drayton, Hamilton, Hansel, Hoople, Hunter, Michigan, Neche, Niagara, Park River, Petersburg and St. Thomas. The rehabilitation and extension planned by the borrower will enable Polar Rural to serve 3,806 subscribers, including initial service to 1,037. Service without toll charge will be available under present plans among the Crystal, Hansel, Hoople and St. Thomas exchange areas; also between Niagara and Petersburg. Completed, the system will consist of 1,590 miles of line.

* * * *

Souris River Telephone Mutual Aid Corp. of Velva, N. D., was granted $1,996,000, to finance the improvement and extension of rural telephone service in Renville, Bottineau, Ward, McHenry, Pierce and Sheridan counties.

Nucleus of the proposed system will be the following acquired properties: Berthold Farmers Telephone Co.; Martin Telephone Co., and 26 subscribers owning their own lines and telephones now receiving service from the Martin company; the Maxbass, Mohall, Sherwood, Tolley, Towner and Westhope Telephone Exchanges from the North Dakota Telephone Co., and 140 rural establishments owning their own lines and telephones presently receiving operator service from these exchanges. These telephone properties are now serving 1,825 subscribers over 712 miles of line.

The loan funds will be used to finance the construction of 1,117 miles of new line, rebuild 498 miles of the acquired line, and construct new dial central offices at Berthold, Deslacs, Martin, Maxbass, Mohall, Sherwood, Tolley, Towner and Westhope. The rehabilitation and extension planned by the borrower will enable the cooperative to serve 2,996 subscribers, including 1,171 now without telephones.

Present plans call for service without toll charge between some of the borrower's exchange areas; similar service is also under consideration between some of the areas and their nearby trading centers. The completed system will consist of 1,690 miles of line.

* * * *

West River Mutual Aid Telephone Corp. of New Salem, N. D., received $444,000, to finance the improvement and extension of rural telephone service in Mercer County.

Nucleus of the proposed system will be the Beulah and Stanton exchanges to be acquired from the North Dakota Telephone Co. These properties are now serving 467 subscribers over 81 miles of line.

The cooperative plans to use the loan funds to build 268 miles of new line, rebuild 78 miles of the acquired line, enlarge the dial switchboard at Beulah, and construct a new dial central office building at Stanton. The rehabilitation and expansion possible under this loan will enable the borrower to bring service to 237 families now without telephones. The completed system will consist of 348 miles of line.

how TVA could be sold without wrecking it.

All this, of course, raises the question of whether Dean Manion can stay in public service, now that his own chief has been forced to differ with him publicly. It also raises the question of whether the President's political opposition will succeed in raising a political issue here—one which could involve the electric utilities and other utilities in a political row next year.

The only unfortunate thing about Dean Manion's statement was the timing. Since his commission has admittedly not yet had the opportunity of examining facts about anything, the

(Please turn to page 34)

SPECIAL AGENT

By CLAUDE P. PETERS
Chief Special Agent
Pacific Telephone & Telegraph Co.
Los Angeles, Cal.

File drawer on right, containing consolidated four-year-old records infrequently referred to, contrasts sharply with "active" drawer on left with folders held upright by FlexiFile and quickly locatable by Armorclad guides at 50-number intervals.

THE TERM "Special Agent" conjures up to many people a picture of international intrigue, or at least of a heavily-disguised character slipping through misty shadows. Nothing, of course, could be further from the truth, at least so far as the special agents of The Pacific Telephone & Telegraph Co. are concerned.

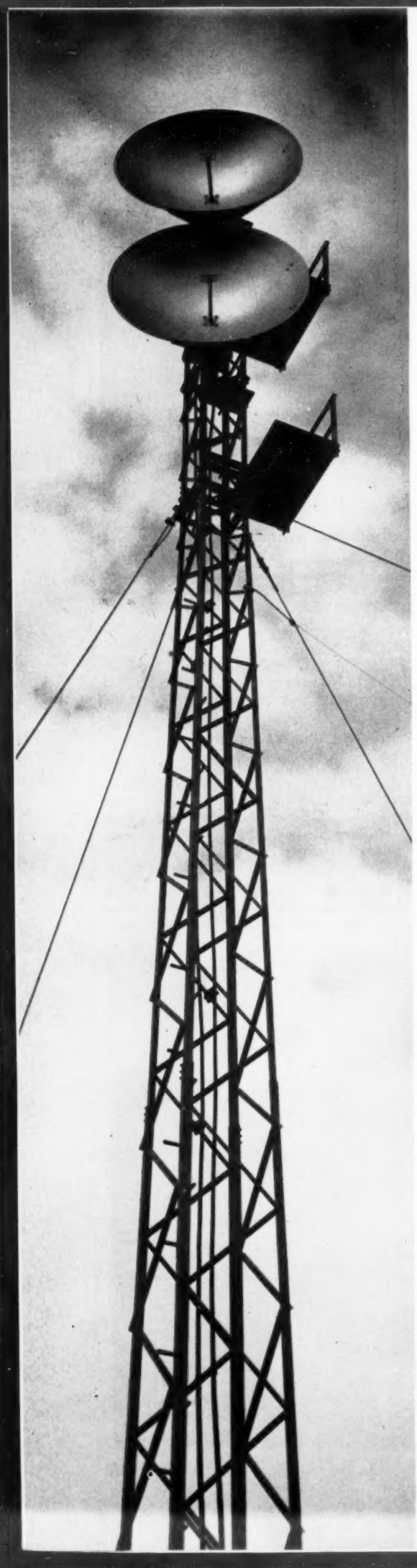
The function of the chief special agent's office has been defined as "a service organization that handles the by-products of company operation." Our very prosaic duties include the investigation and processing of all claims for and against the company, and watchfulness for such things as the recurrent slug in public telephones, paystation thefts, and various frauds.

In the Los Angeles area this means an average load of some 700 "cases" per month, ranging all the way from lost property reports through motor vehicle damages and broken telephone poles. The work of the field investigators must naturally be backed up by comprehensive office records and a proper staff for handling them. This phase of the office is under the supervision of Richard K. Pierce.

Every report to this office is assigned a case number and a serially-numbered control file. Because of the fact that some cases are incapable of quick settlement, our current active files

(Please turn to page 38)

LEFT PHOTO: Quick location of proper case folder is speeded by 5x3 cross-index cards listing all names in case history folders. File contains 112,000 cards, but Variadex makes it easy to find the right one quickly. RIGHT PHOTO: The only complete photo identification file of company employes is maintained in chief special agent's office, arranged alphabetically and guided by Variadex. Employes no longer in service are indicated by red tab on card.



Principles of

MICROWAVE

PART I

MANY TELEPHONE companies today are faced with problems of increasing their toll or inter-office trunk circuit facilities. The outside plant may not be in a condition to accept additional circuits, or extensive new construction may be indicated.

An answer to these problems may be the use of multi-channel microwave equipment in many instances, and the cost may prove to be lower than wire line construction.

While the use of the term "microwave" sometimes connotes a system like the transcontinental television network, the term also includes the equipment used on telephone circuits of 100 miles or less in length. "Microwave" in its popular usage today, refers to frequencies of about 900 megacycles and higher.

The transcontinental relay system uses frequencies in the 4,000-megacycle region, and is characterized by its large lens-type antennas, tall buildings and towers.

A 900-megacycle system is now offered by the manufacturers of communication equipment for use in short-haul service. The equipment for these systems is quite simple. It consists of two or three telephone-style bays of equipment and a saucer-shaped antenna which often is mounted on ordinary poles.

This type of equipment is finding increasing use with telephone companies of all sizes. Smaller companies find it to their advantage to use microwave to extend their facilities to connecting company points. Larger companies, which have two or more exchanges, located 20 miles or so apart, may use microwave for inter-office trunks. It is probably safe to say that if this equipment had been available 20 years ago, a great number of pole lines would never have been built.

Companies which have had experience with microwave now at least consider the use of this equipment on new plant extension. Following are some examples of cases where microwave equipment might prove to be the best and cheapest for the installation:

(1) When a large block of new toll or inter-office trunks is needed to supplement existing channels.

(2) If a new group of channels are needed to serve a new community dial office, or meet new toll requirements.

(3) In cases where a pole line must be rebuilt in order to add new channels, microwave may prove more economical, even though the number of extra channels needed is not large.

(4) Where alternate routing of toll channels is required because of hazards to wire or cable plant.

(5) If a pole line must be rebuilt or a buried cable rerouted because of highway construction or other reasons.

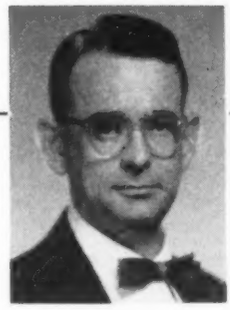
(6) Microwave may also prove to be the answer to problems of temporary installations, such as at military sites, because of its ease of installation and lack of need for outside plant construction.

It should be emphasized that microwave systems should be *considered* in the above applications. It cannot be stated categorically that microwave will always prove to be cheaper than wire line installations. It will be cheaper in a great many cases. For that reason, as well as the matter of reduced maintenance costs, it should be investigated whenever new circuits are required.

In addition to the above applications, there is another matter which may make it to the advantage of the telephone companies to investigate the possibilities of microwave in their systems. That is the matter of widespread use of microwave by non-utility companies.

E OPERATION

by HAROLD B. McKAY



THE AUTHOR

Mr. McKay has had a long and varied career in communications, particularly in the telephone field. He has been associated with the Pacific Telephone & Telegraph Co. since 1925. His past experience includes commercial, personnel and plant. Presently, he is working with toll, carrier and television systems in San Francisco.

Since 1920, Mr. McKay has been active in experimental radio operation and construction and manufacture of occasional custom-designed radio units. From 1945 to 1949 he held a radio-telephone operator's license and did pioneer experimental work on citizen's radio. His recent work has included specialty designed television receiving antenna installations. In addition to TELEPHONY, Mr. McKay has authored articles for leading radio, television and electronic publications. He is an associate member of American Institute of Electrical Engineers and Institute of Radio Engineers and a member of Seismological Society of America.

Some pipe line companies, highway districts, railroads, power companies, mines and other industries (generally referred to as right-of-way companies) whose plant covers large geographical areas have installed microwave systems of their own. There have been attempts by some such companies to connect the privately-owned microwave system into telephone company PBX switchboards.

This, of course, represents a loss of revenue that the telephone company should have, but which it may lose if it is not in a position to furnish the required service.

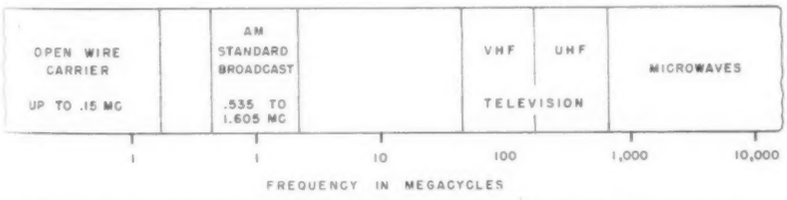
Other industries, which use two-way radio in their vehicles, use microwave links to bridge the gaps between radio stations and thus secure wider coverage.

All of these applications suggest new sources of revenue for a telephone company if it is in a position to supply the service. However, before a telephone company installs a microwave system, certain knowledge should be obtained. An idea of the method of operation of such systems is of great help, because radio is a subject which is new to many telephone men.

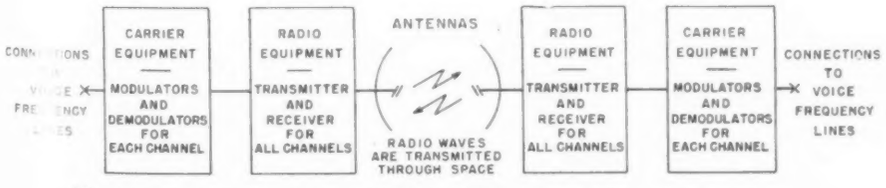
The limits of the system should be known—that is, what it will and will not do. Some idea of the cost factors is necessary, so that an intelligent comparison can be made with other types of facilities.

It is the purpose of this series of articles to acquaint the reader with these facts; to discuss the principles of operation, and the various aspects concerning the installation of such a system. Probably every manufacturer of communications equipment makes or sells some type of radio or microwave equipment. It would be impossible to describe them all here.

Therefore, it will be our purpose to outline the general principles and considerations which are common to all systems, and which will serve as a background for further investigation by the reader. In addition to circuit explanations, an outline of related subjects such as propagation characteristics, antenna sites, cost factors and personnel requirements will be discussed.



Relation of microwave frequencies to those used for other well-known services.


CARRIER EQUIPMENT
MODULATORS AND DEMODULATORS FOR EACH CHANNEL
RADIO EQUIPMENT
TRANSMITTER AND RECEIVER FOR ALL CHANNELS
ANTENNAS
RADIO WAVES ARE TRANSMITTED THROUGH SPACE
RADIO EQUIPMENT
TRANSMITTER AND RECEIVER FOR ALL CHANNELS
CARRIER EQUIPMENT
MODULATORS AND DEMODULATORS FOR EACH CHANNEL
CONNECTIONS TO VOICE FREQUENCY LINES

Microwave can be regarded as merely an addition to a carrier system, providing an additional stage of modulation to position the carrier channels in the microwave frequency spectrum for transmission through space rather than over open wire lines or cables.

Principles of Radio and Microwave

Radio is the radiation of electromagnetic waves through space. This term, then, includes all forms of such radiation—broadcast, short-wave, television, radar and microwave. All of these means of communications operate on the same electrical principle. All make use of the fact that a circuit carrying alternating current sets up an alternating field around it which may extend for great distances.

A radio transmitter is a generator of

Principles of MICROWAVE OPERATION *(continued)*

alternating current which sends its power into an antenna wire and thus causes electromagnetic waves to travel through space. A radio receiver is a device which responds to, or detects, these waves and amplifies them.

All radio systems work on this principle. The big difference between systems is the frequency of alternating current used. Alternating current of any frequency will set up waves in space which may be received at a distant point. Every telephone man knows that even a 60-cycle power line can send waves trough space which will be received on a telephone line in the form of noise.

How far electromagnetic waves will travel, and how they will behave, depends a lot on the frequency of the current which generates them. It is this point which makes the difference between broadcast, short-wave, microwave, etc.

An electromagnetic wave, or radio wave, as we shall now call it, behaves much like any other wave; it usually travels in a straight line like a beam of light until something stops it, absorbs it, or reflects it.

A radio broadcast antenna sends waves out in straight lines in all directions, like a beacon. These waves will travel a moderate distance through hills, buildings and other obstructions.

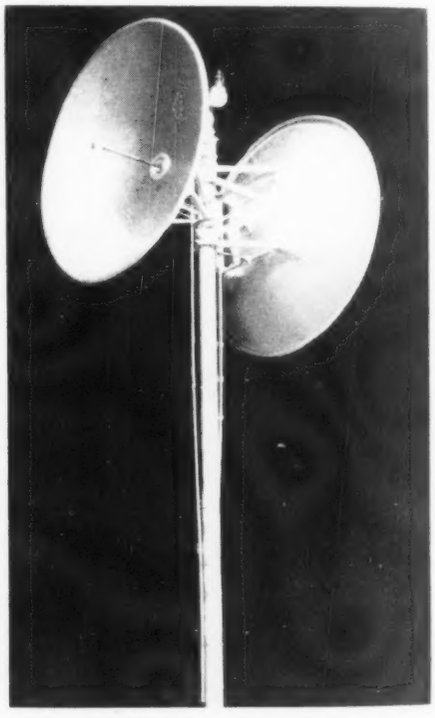
As the frequency of radio waves is increased they lose their penetrating power and tend to reflect from objects they strike. Television, which uses frequencies of 60 million cycles per second or more, penetrates some objects and reflects from others. These reflections cause the ghosts which are sometimes seen on the TV screen.

At the frequencies ordinarily used for telephone microwave in the United States (900 million cycles or 900 megacycles) the waves have virtually no penetrating power; they reflect from, or are absorbed by, nearly anything they strike.

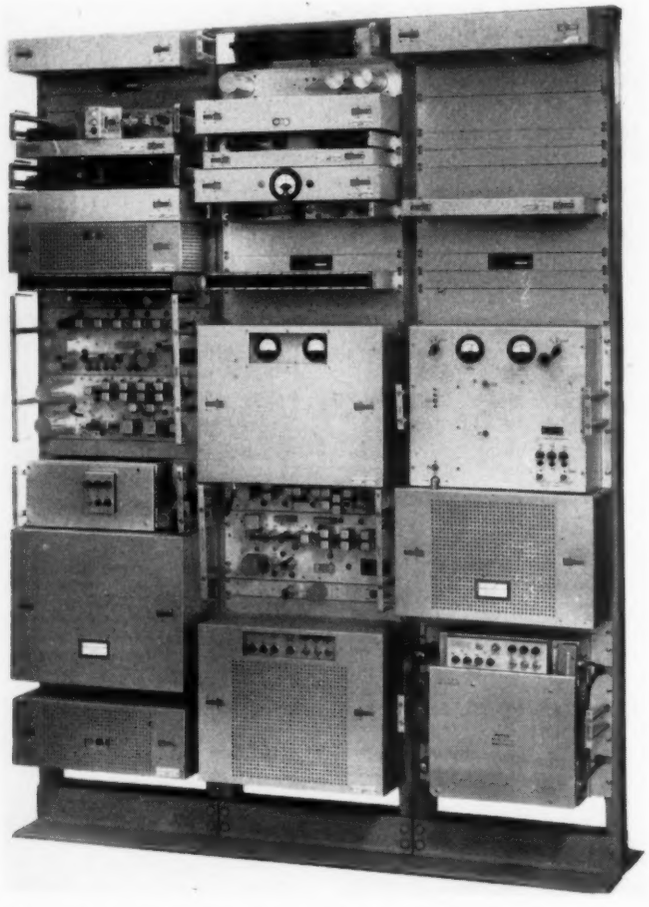
Because the wave reflects so easily, reflectors can be placed on the antenna to increase the effective power of the signal. A saucer-like reflector of sheet metal or mesh can focus the radio waves just like a polished reflector can focus a beam of light. The increase in power obtained in this manner is important in microwave systems. With a reflector focusing the antenna wave into a beam, a low-powered transmitter (five watts or so) can send a wave up to 35 miles. A broadcast station, which sends its signals in all directions might use several hundred watts of power to cover the same distance.

There is a further advantage in this for telephony. The narrow beam of signal prohibits anyone from listening in on the circuit unless he is directly on the beam. In addition, other systems using the same frequency can operate, without interference, as long as they are not on each other's beam. There is the disadvantage, however, that an unobstructed path must exist between the transmitter and receiver of any microwave system. If a hill, or other obstruction, blocks the beam it will prevent the signal from getting through satisfactorily.

Radio and microwave are, therefore, seen to be different forms of the same science; the principle difference is the



Down-to-earth view of microwave "dish" antenna shows details of design. Two like this may be used at a repeater point, one to receive the signal, the other to send it on to the next station. (Photo by Prodelin, Inc.)



The microwave system pictured here, which has some of the dust covers removed, will handle up to 36 toll quality telephone channels when connected to carrier equipment. Equipment on the left hand rack includes two receivers. A transmitter and power supply are included on each of the other two racks. Double transmitters and receivers provide for standby service in case of failure. (Photo courtesy of Lenkurt.)

way the waves behave in space. The electrical apparatus used for different forms of radio, whether broadcast, short wave or microwave consists of parts which perform similar functions in each service.

Usually, as the frequency is increased, component parts become smaller but they are still the same kind of units—that is, until the higher microwaves are reached. Systems like the transcontinental microwave relay which operate on about 4,000 megacycles must use pipes which are called "wave-guides" instead of wires for transmission of radio waves within the terminal.

Fortunately most components for operation in the telephone 900-megacycle microwave service are similar to those used in radio sets or carrier equipment. In fact, carrier equipment is part of a microwave installation. Microwave may be regarded as merely an addition to a carrier system, since it raises the frequency high enough to travel in a beam through space instead of along wires.

Principles of Carrier

Because there are a number of telephone companies which do not yet use carrier, a short explanation of this type of circuit may be in order.

Telephone traffic may be regarded like any other kind of traffic—highway traffic for instance. The problem is that of getting a number of "units" (conversations or vehicles) from one point to another over a common route. When highway traffic becomes too dense, more lanes must be added to the highway. When telephone traffic becomes too heavy, more circuits must be added to the poles.

When the highway reaches its limit, another must be built. The telephone company might have to build another pole line when the limit of the first one is reached. Both problems could be solved nicely if there was some way to get more traffic units over the original route, without adding more lanes or wires as the case may be. In the case of the highway, the problem has not yet been solved. In telephony it is possible to put conversations on top of one another, so to speak, by use of carrier equipment.

A carrier system is equivalent to a small radio transmitter and receiver. In fact it is actually several transmitters and receivers put together. Each operates on a different frequency just as the different broadcast stations do. All radio stations send their signals through the same space or air; they are separated at your radio receiver by "tuning" to the station you want.

Similarly, several carrier channels are sent over the same wire lines. Each transmitting unit uses a separate frequency. At the distant end a separate receiver is tuned to each transmitter, thus separating the many conversations carried on the circuit.

The tuning of carrier equipment is accomplished in much the same manner as in a radio set, but the frequency is fixed rather than adjustable with a knob as is a radio set. While a description of tuned circuit considerations is beyond the scope of this article, it may be said that these circuits are usually combinations of small coils and condensers. Each carrier channel is tuned by means of these components to be resonant at a certain frequency.

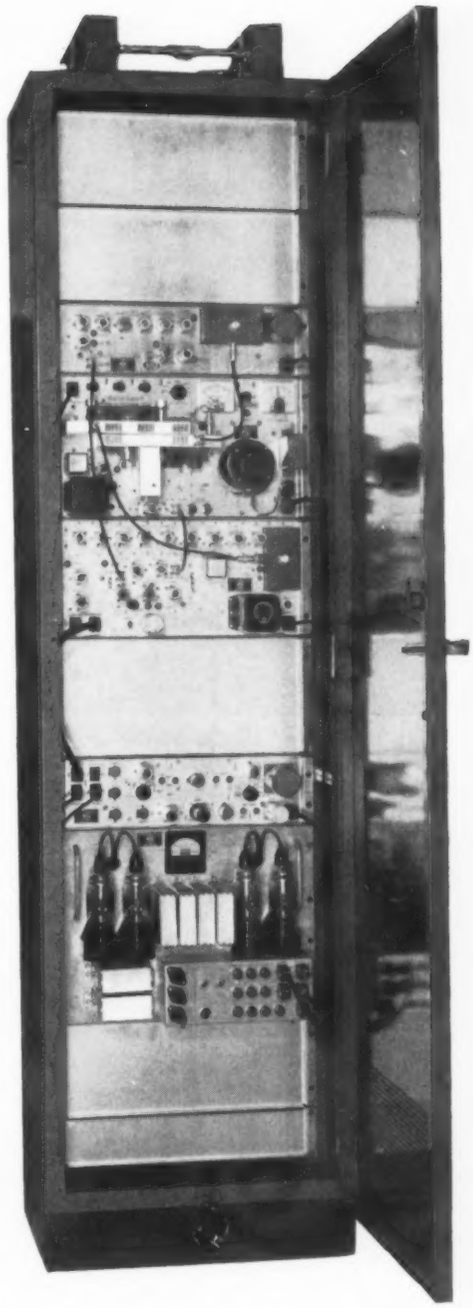
Tuned elements in carrier systems are of precision manufacture. Also called "filters," these elements are classed as low-pass filters, high-pass filters or band-pass filters, depending on their use in the circuit. The operation of these devices depends upon the principle that a combination of circuit elements may be arranged so that alternating current of only one frequency will pass through it, even though many frequencies may be fed into them. This would be a "band-pass" filter.

Filters can also be made to reject one band of frequencies and pass all others. A low-pass filter passes all alternating currents up to a certain point, then cuts out, or rejects all that are higher. An example of this is a tone control on a radio set, which can be adjusted to pass the low frequencies, but cut off the highs.

In a 12-channel carrier system, 12 trunk lines are fed into 12 small radio transmitters. Each voice is mixed with a radio frequency current in the transmitter. Each transmitter uses a frequency different from the rest. The output of all of the carrier transmitters is then coupled to the telephone line. Therefore, all 12 conversations are going over the same line at once. At the receiving end, by the use of filters, each conversation is screened out from the rest; the radio frequency is removed and the conversations sent on their separate trunks.

In practice, a separate pair is often used for each direction of conversation. That is, many carriers use four-wire operation. One pair carries the east-to-west voice while the other carries the west-to-east voice. Each pair has the required number of transmitters at one end, and a similar number of receivers at the other. A carrier terminal consists of a set of both transmitters and receivers.

In microwave systems, two radio beams are used for the same reasons; one transmits in one direction, while its mate transmits in the other direction.



Microwave equipment is relatively compact. This cabinet contains a CW-20A terminal station. It will handle 24 channels of single-sideband suppressed carrier signals. (Photo by RCA.)

Carrier then is practically the same as radio. If enough power were applied to a carrier system, it would indeed become a radio transmitter and no wires would be needed to carry the signal to a distant point. However, carrier systems operate on frequencies below 200 kilocycles. In radio service, these frequencies are used for navigational purposes. Therefore, if telephone services used these frequencies through

(Please turn to page 33)

Front entrance to the new central office building of the Warren (O.) Telephone Co.

OHIO OPEN HOUSE

—door to Good Public Relations

by DAN FARGO

Warren (O.) Telephone Co. holds open house. Declared by both company and public to be successful in acquainting visitors with what is involved in providing telephone service. Impressions reinforced with the mailing of a brochure on the company to subscribers.

THE WARREN (O.) Telephone Co. five-day open house beginning on Sept. 22 and held in the company's new central office building and new toll building, was pronounced "public relations at its best" by company officials. The number of visitors reached 3,000.

Entertained on the first day were employes and their families, on the second, public officials of the Warren-Youngstown area, and on the third day, shareholders. On the last two days, Friday and Saturday, the public was welcomed at the open house sessions.

Ralph Mateer, vice president and general manager of the company, revealed that both buildings visitors were shown, central office and toll, are of steel and masonry construction, and have two complete gas-fired heating systems, three air conditioning units, and three air cleaning units.

Mr. Mateer added, "Every room in the building has been treated with acoustical material to insure quiet and the lighting is of the fluorescent type, either cove or flush ceiling style. In all equipment rooms the walls are of glazed tile."

Other features provided in the new main office, according to Mr. Mateer, are attractively decorated employe lounges, including luncheon facilities; a "quiet room" furnished with beds and first aid equipment in case of emergency illness, and new modern office equipment.

The Warren *Western Reserve Democrat*, a local newspaper, described an open house visitor's first impression as follows:

"The door swings noiselessly open. . . . The slightest touch and it glides back for one to enter. . . . The bromidic 'Push' and 'Pull' which were included in the blueprints are unnecessary. . . . One finds one's self greeted by soft music, in a spacious, beautifully decorated rotunda, reminding one more of the lobby of a fashionable hotel (see photo of commercial office) than the entrance to a telephone exchange . . . open to invited guests and to the public in an 'at home' fashion."

The "soft music" referred to in the newspaper account is one of the many features of the new plant. Long-playing records furnish the music which can be piped into every room in both the central office and toll buildings.

Another attraction in the central office building is a small theater, seating 46 persons. This miniature auditorium will be used in the company's employe training program and for educational film programs of civic groups.

Regarding mechanical equipment, Mr. Mateer said that the Warren plant has 7,200 lines of automatic telephone equipment at this main plant plus complete operator toll dialing equipment.

Around open house time, a 16-page brochure describing the company as "Your Doorway to the World," was mailed to all of the company's subscribers and shareholders as well as to 181 telephone companies in Ohio. This was another well-done public relations feature. It tied in with the open house appeal to the public and carried a picture of the new main building on the cover.

The brochure begins:

"Your doorway to the world is a magic instrument called the telephone. The magic it performs is made possible in the Warren area by about $10,000,000 of intricate telephone equipment, plant and buildings.

"The Warren Telephone Co. is a local enterprise. Today a majority of the stockholders are local citizens . . . perhaps you are one of them yourself.

"With the common interests of your community in mind, the present management of the Warren Telephone Co. has worked for 15 years to make ultra-modern telephone service a reality here.

"Your call may travel over any of the paths involved in the interchange of calls. To accomplish this millions of miles of wire are necessary in the switching equipment as well as the outside plant, the major portion of which has been installed in the last eight years.

"As you dial you send impulses over your circuit to switches either in the main office or sub-office, and your call may take any one of millions of paths depending on the number you are calling selected by your fingertip in the dial on your telephone. *Your telephone company furnishes the equipment and plant—you make the service.*

"Long distance calls are now completed much more rapidly, due to new 'inter-toll' dial equipment and a long distance switchboard with 40 operator-positions. Warren operators can dial numbers directly in more than 2,000 cities and towns across the nation. More toll dial exchanges are going into service every month. Your telephone system has been largely rebuilt to give you unexcelled telephone service."

In tracing the company's history which follows, the brochure shows graphically how the number of telephones added since the present management took over in 1938 has far outstripped, percentagewise, the increase in population and the increases in water, electric and gas meters. With 11,244 telephones in 1938, the company has increased the total to 30,296 as of July 31 this year.

The important part the telephone plays in a Warren company subscriber's daily life is emphasized. After listing a number of typical and emergency uses a subscriber makes of his telephone, the brochure concludes that "This is a tiny cross-section of what the telephone does for you. Some calls are vital . . . extremely urgent. Some are trivial. But all are important to you in a personal, social, civic or economic way. The telephone is an integral part of everyone's daily life in these United States."

An analysis is made of why the number of telephones serving the Warren area has grown so fast—more people wanting them and considering them a necessity, and the company's standards of service having stood the test of time.

The Warren company's standards which make good service as outlined in the booklet, are:

"Dial tone within three seconds on 95 per cent of calls. Dial switches connect you quickly to our central office when you place your call.

"Long distance answers within 10 seconds on 95 per cent of calls.

"Average case of trouble cleared within four hours.

"Enough telephone cable and central office equipment to handle 95 per cent of calls without encountering a busy trunk or switch."

To maintain good service, the Warren company listed in the brochure the following standards it adheres to:

"Good telephone equipment gives good telephone service only if it is properly maintained. We conduct periodic tests of dial switches and central office equipment. We make regular inspections of cable, wire, poles, to make sure that every single part of your telephone network is in the best possible condition.

"*We Stop Trouble Before It Starts.* Complete repair records are maintained for *every telephone* and *every line.* This makes possible a system of preventive maintenance which stops trouble before it starts.

"*We Even Vacuum Clean Dial Equipment.* The electrical operation of your dial telephone depends upon thousands of tiny electrical contacts. Dust or grit in our central office could create havoc. We regularly vacuum clean all of this equipment and make regular inspections of every single switch.

"*Prompt Installations.* Orders for service are processed immediately and installations made promptly under normal conditions. Where abnormal conditions exist, the applicant is given an estimated date of installation without delay."

Continuing, the brochure lists the company's standards that have expanded good service:

"*Know the Needs:* The first requirement in building good telephone service is to know what your particular community needs — how big the cable should be — how many lines of dial equipment are needed—what the probable long distance usage will be—and where the majority of calls are likely to be made. Since many communities are constantly changing in their geographical limits, population and interests, knowing the needs of any one community is an ever continuing, ever important job for the Warren Telephone Co.

"*Plan Ahead:* Planning in advance is most important in the telephone industry. In our business it may take a manufacturer from 12 to 24 months to deliver equipment ordered. Before this equipment is ordered, as much as a year may be involved in preparing plans. So, it is not unusual for us to be working as much as five or 10 years into the future.

"*Build Ahead:* Our telephone buildings, our equipment, and our cable network are designed to provide a reserve for future growth. Today, we have sufficient equipment and cable, not only to handle peak loads, but to allow for expansion."

What plans and steps are required in building for the future are also summarized in the booklet. Completion of the company's new Normandy sub-exchange building took the following steps from blueprints to cut-over:

"(1) Scientific estimating of area telephone requirements.

"Our commercial engineers made on-the-ground surveys of both present and potential telephone development in our concentrated operating area.

"(2) Ordering equipment two years ahead of time, if possible. The equipment for this new building was ordered in August, 1951, 21 months before it was in service.

"(3) Allowing 14 months for erection of building and installation of equipment. This was the actual time required for the Normandy sub-exchange building's completion and dial installation.

"(4) Placing more cable and wire from new building to meet service requirements of surrounding neighborhoods.

View of the commercial office of the new Warren company central office building.

"More telephones inevitably require more 'voice paths' or circuits.

"(5) Hiring and training more people to maintain this new equipment.

"(6) Installing new telephones.

"(7) Finally, we must pay the bill for the expansion, before we receive a single dollar from the public for the service it will ultimately receive."

Included also in the brochure are a study with pictures of why telephone expansion, unlike other utility expansion, does not lower the cost of pro-

(Please turn to page 38)

THE PLANT MAN'S Notebook

by Ray Blain, Technical Editor

THE 56TH ANNUAL meeting of the USITA will long be remembered as one of the most successful in the long history of that organization. Over 70 exhibitors had interesting displays of their latest tools, materials and equipment. These exhibits drew large crowds every day during the meeting. Independent telephone people learned long ago that this is an ideal means of obtaining up-to-date information and answers to their numerous problems.

Certainly no one may claim that the plant man's interests were neglected in this year's meeting. The Plant Committee, under the able direction of Chairman W. M. Driggs, presented an outstanding program covering important subjects such as toll dialing, microwave, shortage of technical workers, and how assistance can be extended to the smaller operating companies. Numerous interesting papers on popular subjects were also prepared by other members of the Plant Committee and distributed at the meeting. These papers will be published in full in future issues of TELEPHONY.

Again, the Plant Committee's room served a most useful purpose as a clearing house for plant problems. The plant visitors were many, and practically all of them had problems for which they were seeking answers. Dan Seitz and his able assistants again worked long hours and did a wonderful job in supplying information to the best of their ability. Information was also furnished on desirable methods for the successful training of practical plant installation and maintenance personnel.

The Independent telephone industry in the United States is suffering growing pains and is presently operating nearly 9 million telephones. This rapid expansion requires recruiting an army of new workers. The selection and training of these new employes, and furthering the training of old employes so that they will prove a worthwhile investment to the operating company, requires a well-planned program. The Plant Committee of the USITA recognizes this need and is initiating definite action to assist in its accomplishment.

Manufacturers are rendering valuable assistance in this connection as was evidenced by equipment, tools and materials on display. Materials and tools are designed with a view to reducing the cost and effort required for installation and maintenance.

Many of the new equipments are of the plug-in unit type. In some cases these units are plugged in a test set and a red lamp will indicate trouble and a green lamp an operating unit. Defective units are replaced by new ones and the old are sent to a shop for repairs.

In this writer's opinion, this is a real advance in the art of communication. Not only does it reduce the outage time of equipment, but it also reduces the training period of troublemen to a minimum. Let's hope that we have more of these features in the future.

It was somewhat surprising to note the large number of plant men this year who were seeking information on microwave and carrier systems. Various types of these systems were on display and technicians were in attendance to explain them in detail.

It appears obvious that the use of carrier systems is to be increased tremendously in the future, both for toll and subscriber line service. The price is now down to a point where this equipment can be proved in; and the maintenance is simplified to such an extent that the average small company can maintain it without difficulty.

Packaged microwave relay systems also will unquestionably prove popular and a good investment in many areas. The systems installed by Independent operating companies so far have proved entirely satisfactory.

Plastic cable has definitely proved its worth in the Independent telephone industry. Even the most violent doubters of a few years ago have been won over to this new product and they now realize its numerous advantages.

There was a time when many doubted whether self-supporting plastic cable would ever prove satisfactory. Now that many of these installations have been in service for a number of years without requiring excessive maintenance, the doubters are convinced that this less costly type of construction does prove highly desirable for certain types of plant.

Considerable progress is presently being made in the improvement of splicing methods for plastic cable. It has also been learned that plastic cable does not require as much splicing as the lead-covered variety. The plastic cable may be looped through terminals in most cases with pairs tapped in as desired without the necessity of splicing. Special terminals are available to permit this arrangement without the services of trained cable splicers.

One interesting convention exhibit consisted of a glass tank with gold fish swimming around a submerged cable terminal. Lead cable was spliced into one end and plastic at the other. A drop wire was also connected to the terminal with a sensitive voltmeter connected to the free end. A gauge indicated that a pressure of over 10 pounds per square inch was maintained inside the cable and the terminal.

The gold fish were not disturbed by bubbles which indicated escaping gas, and neither did the voltmeter show any leakage on the drop wire. This test certainly indicates that this type of terminal and splicing technique should survive and give good service in almost any climatic conditions.

There was also an exhibit showing how compression type connectors may be used to splice plastic-insulated cable conductors. These connectors, which pierce the insulation to contact the conductors, were used to make all types of connections in cable conductors without removing the insulation. While this idea is new and will require continued research, it certainly has interesting possibilities for future use. This confirms at least in part our frequent

contention that the twisted splice in cable conductors will eventually be replaced by a more modern and better arrangement.

Mechanical toll ticketing systems of several different types were on display and attracted special attention. Extended area dialing in some areas will undoubtedly bring about the early use of this equipment. Recorded message announcer equipment, designed for intercept service, proved interesting and will serve a most useful purpose on number changes, etc., in many exchanges.

New tools received their share of attention as labor-saving devices and are always popular in the telephone field.

One little item that will prove extremely useful is a so-called "pole wrench." This is essentially a cant-hook and is used to turn poles after they are dropped in the holes. In the old days, two cant-hooks were generally used for this purpose. This is essentially a double hook device with a handle in the center and a bracket on the under side so that it will stay put on the pole. It can be used to turn the pole in either direction. We wonder why someone did not think of it many years ago.

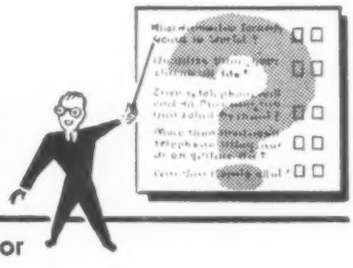
Line construction trucks, earth boring machines and ladder trucks were on display in the parking lot just west of the Conrad Hilton Hotel.

Telephone booths for both inside and outside use were on display. The use of outdoor type booths is on the increase in all sections of the country and there is a type available to meet almost any requirement.

We are sorry that our old friend, F. M. (Red) Parsons of the Kellogg Switchboard & Supply Co., could not be present at this meeting, the first one he has missed for many a year. Red was convalescing in the hospital from an operation. We talked to him by telephone and he is doing fine. He told us he expected to be home in about a week and back on the job in less than a month.

Although there will be many more annual meetings of the USITA, and perhaps some of them will be larger than this particular one since our industry is certain to expand for many future years, we do doubt, however, that any of them will be more successful from a plant man's viewpoint than the 56th annual meeting which is now a part of telephone history.

PLANT MAN'S QUIZ



by RAY BLAIN, Technical Editor

Q. Can we provide an arrangement on a dial system so that calls are disconnected after a specified interval? It is believed that this plan would give better service to a greater number of customers on our busy lines.

A. This feature can be provided on any dial system by adding the necessary special equipment. We have had several reports in which this arrangement has been tried and has proved popular with the customers. It is suggested, however, that a careful survey be conducted before attempting to adopt this feature in any exchange. It is also suggested that if the cut-off is to be made at the end of a four-minute period that a warning tone be given at the end of three minutes.

• • •

Q. What are the advantages of the splint type tie over the conventional type when used on open wire lines?

A. This type of tie is designed to provide better vibration dampening, exerts a strong grip on the line wire and prevents contact between the line wire and the insulators.

The spiral sections of the splint tie have a core diameter slightly smaller than that of the line wire which increases the dampening action further.

The gripping action of the splint tie also holds the wire against slippage and tends to confine repair jobs on ordinary line breaks to a single span.

Abrasion wear is also practically eliminated as there is no contact between the line wire and the insulators.

• • •

Q. Will you please explain why a varistor is connected across the operator's receiver on some manual switchboards?

A. The varistor is frequently used in this manner to act as a noise and acoustic shock reducer. Acoustic shock may be caused by any sudden application of an excessive voltage across the telephone receiver. The cause in most cases is an extraneous voltage impressed on the telephone line by lightning, a power contact or power line induction.

The varistor is connected directly across the receiver so that when the voltage of speech is applied, it has a normal impedance of about 2,000 ohms, with very little current shunted around the receiver.

However, when a high voltage is applied to the receiver as caused by a power cross, the impedance of the varistor drops to a low value which permits the greater part of the current to be shunted through it. This permits only the low voltages to be placed on the receiver.

• • •

Q. Please explain the term "preventive maintenance" as it applies to central office equipment.

A. This type of maintenance is accomplished by making periodic tests from time to time to determine whether the equipment is functioning properly and to prevent service interruptions because of substandard conditions. When irregular conditions are found on these tests, they are corrected promptly before they can cause service interruptions due to equipment failures. This method also often prevents intermittent troubles in equipment which are usually most difficult to locate by any other means.

Proper preventive maintenance practices will avert equipment deterioration to any great extent during its entire period of use.

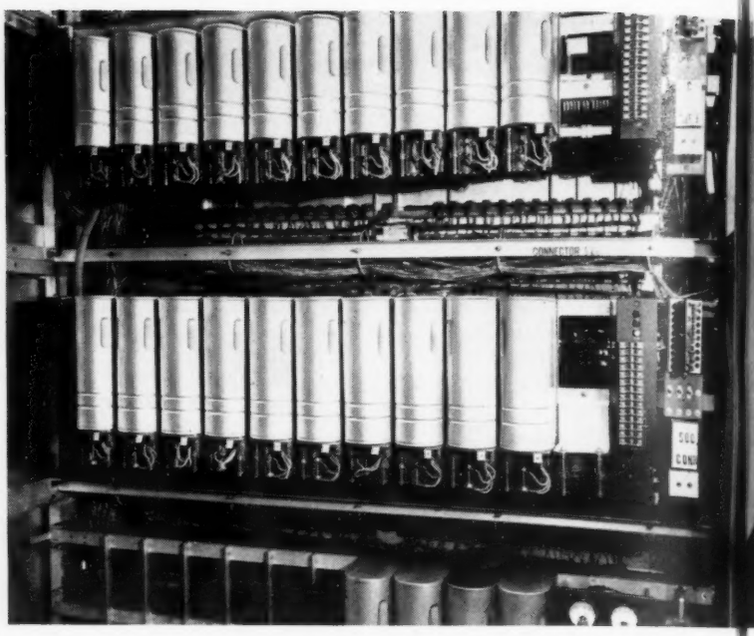
• • •

Q. What action is recommended to prevent poles on a rural line from being split by lightning?

A. This damage may be eliminated or at least greatly reduced by the installation of ground wires. In excessive lightning areas, the ground wires should be installed on each pole. In the average rural area, however, a ground on each fifth or tenth pole will usually prove adequate.

The ground wire should extend from the top of the pole to well below the ground level. It is also a good practice to leave a gap of about two inches in the ground wire at a point a few feet above the ground line. This may prevent trouble due to the line coming in accidental contact with the ground wire.

TO FIND OUT FAST if an item is carried in stock, a sales clerk merely dials the stock clerk's number and...



THE CONNECTION IS MADE INSTANTLY by Strowger Automatic P-A-B-X, so that...

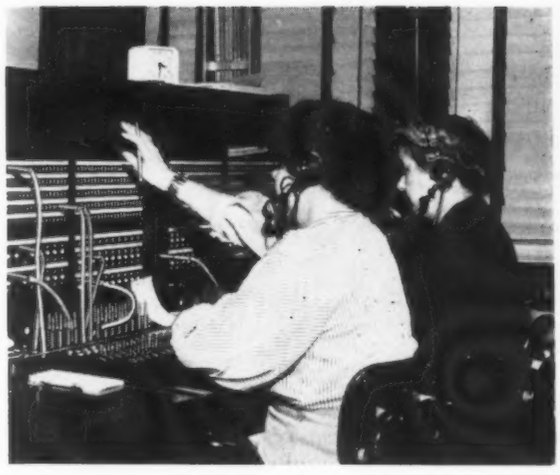
Automatic's P-A-B-X's Step up Store —and telephone revenue!

A Private Automatic Branch Exchange works wonders in speeding store operations. It provides "quick-as-a-wink" internal communication and fast contact with the outside which step up service and build trade for the store. That's why every sizeable store in your area is a potential source of P-A-B-X business.

Want help selling P-A-B-X? Our representative will be glad to work right with you as you call on stores, factories, schools, and other prospects. He'll suggest sales stratagems, help you approach your prospects, produce sound solutions to communications problems, and help you clinch orders for P-A-B-X service.

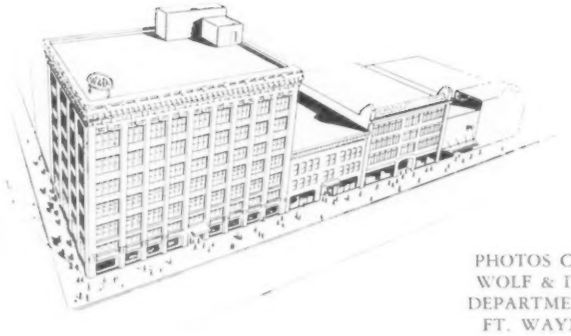
Here's more help, too! We've prepared an attractively illustrated 28-page catalog with a handy guide that makes it easy to pick the right P-A-B-X for each prospect. It describes our complete P-A-B-X line — from small models serving 10 telephones to large ones serving over 200. It also gives a full list of auxiliary services, such as Night Watchman Service, and Secretarial Answering Service. Other telephone men are building their revenue with P-A-B-X—why not **you?** Start by writing for Catalog 4060-B today!

IN A FLASH, the stock clerk gives the necessary information.



CALLS TO AND FROM OUTSIDE ARE HANDLED QUICKLY at a modern attendant's cabinet. (In smaller systems, no attendant's cabinet is needed. Calls can be "picked-up" at any non-restricted telephone and transferred.)

re ervice



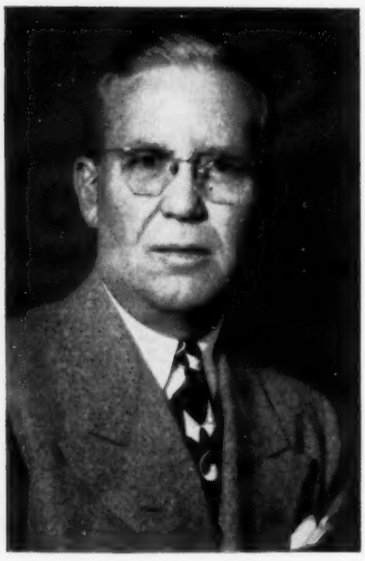
PHOTOS COURTESY
WOLF & DESSAUER
DEPARTMENT STORE
FT. WAYNE, IND.

AUTOMATIC ELECTRIC

Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . Machine Switching Automatic Dial Systems

Makers of Telephone, Signaling and Communication Apparatus • Electrical Engineers, Designers and Consultants

Distributors in U. S. and Possessions: AUTOMATIC ELECTRIC SALES CORPORATION
Export Distributors: International Automatic Electric Corporation
1033 West Van Buren Street, Chicago 7, U. S. A.



RAY DALTON
Vice President

F. S. BARNES
President

J. B. HALEY
Vice President

MAYME WORKMAN
Executive Secretary

Pioneer Meeting Highlights USITA Convention

By R. C. RENO

J. K. JOHNSTON
Secretary

AS IN THE PAST YEARS, the annual meeting and entertainment of the Independent Telephone Pioneer Association on Oct. 13 was one of the highlights during the recent annual convention of the United States Independent Telephone Association.

Following the Pioneer business session the Purdue Varsity Glee Club, which has entertained the Pioneers and USITA convention-goers on two previous occasions, presented a musical program to a "full house."

The business meeting was opened by President Ray W. Smith of Chicago who read a letter from the association's founder, J. K. Johnston of Indianapolis, Ind., who was unable to attend the meeting because of illness. Mr. Johnston's letter follows:

"We should salute the early Pioneers of the Independent telephone business, who risked their savings and career in an industry, the fruits of which the entire nation has shared. We of the Independent Telephone Pioneer Association are stewards of the trust they had in Independent telephony.

"Naming a few of the following with 50 or 60 years in the industry: John H. Agee, Oscar Burton, John C. Crowley Jr., B. L. Fisher, Herman E. Hageman, Gustav Hirsch, C. L. Jones, Arthur R. Maytum, C. P. McCluer, William J. Melchers, Albert J. Parsons, Sam H. Shutt and Otto Wettstein, Jr.

"What can the members do to promote the association? By soliciting new members, as there are hundreds of eligible employes who would become members, if asked. This would assist the executive secretary, Mrs. Mayme Workman, who has worked faithfully to increase the membership. I personally know that she has a personal interest in the welfare of the Pioneers. The monthly reports show the association in a healthy financial condition. She is entitled to all the support that the members can render her. I am sure she will appreciate any assistance received.

"I know from past experience that her duties require a lot of careful supervision. If you will refer to the last issue of the roster you will understand the amount of work required to compile, proof read and mail out. Also sending out notices of dues and collecting require considerable detailed work.

"Let each member get back of the drive for new members."

The Pioneer association was shown to be in a healthy condition by the report of the executive secretary and treasurer, MaymeWorkman of Springfield, Ill. Mrs. Workman's report, in part, follows:

"The executive secretary's report is

résumé of a few of the major activities of your association since the last annual meeting of members.

"Four 'Independent Pioneer' bulletins were published and mailed to all members. The 1953 biennial official roster has been published.

"Your executive secretary represented your association at the following conventions and Pioneer meetings: The Illinois, Wisconsin, Indiana and Pennsylvania conventions; the USITA Executives' Conference; a Pioneer breakfast sponsored by the J. K. Johnston Chapter in Indiana, and the first annual meeting of the Keystone State Chapter in Pennsylvania.

"A new Pioneer Club was organized, namely, 'The Adirondack Pioneer Club,' by the General Telephone Company of Upstate New York and its employes, and the Illinois Commercial Pioneer Club changed its name to 'The Illini Pioneer Club.'

"As of Sept. 30, 1953, your association had 3,952 members. During the 12 months ending Sept. 30, 1953, we enrolled 483 new members and reinstated 34 and added 22 new associate members, making a total gain of 539. During the same period we lost by death 53 members, and dropped 224 members for failure to pay dues, and 29 members resigned—a net gain of 233 members."

The resolutions committee's report was presented by Paul L. Cowan of Erie, Pa., chairman. Two resolutions were adopted—one commending the officers of the association for their efforts in behalf of the association and one commemorating the deaths of 53 Independent Pioneers. Those whose deaths were reported during the past year were:

Amelia Aden of Wilber, Neb.; William C. Avery of Honolulu, Hawaii; Wallace T. Backus of Lincoln, Neb.; C. N. Beaver of York, Neb.; Robert T. Blair of Wichita, Kan.; Harold A. Brown of Cooperstown, N. D.; Herbert Bryan of Drexel Hill, Pa.; Joseph E. Byrne of Madison, Wis.; A. B. Clark of Columbus, Neb.; Lawrence E. Clark of Honolulu, Hawaii; Stella May Clark of Auburn, Neb.; Jerome E. Cooley of Redwood City, Cal.; James N. Cox of Cookeville, Tenn.; H. O. Denhart of Ransom Ill.; John H. Dial of Jacksonville, Ill.; Frank L. Eldridge of Chicago, Ill.; Fern S. Fadley of Norwalk, O.; Charles G. Folts of Plattsburg, N. Y.; Clarence E. Furber of Columbus, O.; Theodore Gary of Kansas City, Mo.; William F. Goodrich of La Crosse, Wis.; Fred S. Haines Jr. of Morrison, Ill.; Charles C. Havlichek of Whitelaw, Wis.

Peter Herrian of New Ulm, Minn.; Andrew Edward Holt of Fort Wayne, Ind.; John F. Hosea of Columbus, Ind.; Ben H. Hughes of Seward, Neb.; S. C. Jensen of Racine, Wis.; Isaac Kanae of Honolulu, Hawaii; Rudolph Kebling of Chicago, Ill.; Charles J. Klapper of Brownwood, Tex.; Fred Lange of Lafayette, Ind.; Monroe Lausch of Denver, Pa.; C. W. Lemont of Lincoln, Neb.; Alice L. Maley of Richmond, Ind.; Harold D. Manuel of Rome, N. Y.; George Martin of Columbus, O.; Nelson L. Mew of Long Beach, Cal.; Samuel A. Miles of Tucson, Ariz.; William M. Mouden of Osceola, Neb.; Dorothy V. Newton of Brooklyn, Ia.; Thomas A. Osborne of Santa Monica, Cal.; Thomas D. Owen of Ottsville, Pa.; John B. Rhodes of Zanesville, O.; Earl A. Rosker of Lincoln, Neb.; Theodore H. Sanders of Fort Wayne, Ind.; Laura Strasser of Rock Island, Ill.; O. W. Stubblefield of Ipava, Ill.; O. L. Sturtevant of Lincoln, Neb.; John W. Voss of Mondovi, Wis.; William H. Weaver of Lafayette, Ind.; Wesley C. Wildrick of Logansport, Ind., and Gilbert H. Williams of Seymour, Tex.

Officers and directors of the Independent Telephone Pioneer Association. Left to right: RAY W. SMITH of Chicago; MAYME WORKMAN, executive vice president; FOSTER B. McHENRY of Jefferson City, Mo.; D. M. McNULTY of Chicago; GENEVIEVE SAUERHAGE of Springfield, Ill.; J. B. HALEY of Austin, Tex.; and CLYDE McFARLIN of Montezuma, Ia. Not present when photo was taken: Frank S. Barnes of Rock Hill, S. C.; F. E. Bohn of Fort Wayne, Ind.; Ray Dalton of Everett, Wash.; and Paul L. Cowan of Erie, Pa.

Winners of the Pioneer hobby show were announced by President Smith, who commended H. B. Couch of Topeka for his work as chairman of the Hobby Committee. The winners were:

Men's First Prize: Thomas S. Risser of Lincoln, Neb.—Exhibit metal name plates.

Ladies' First Prize: Blanche Majdanik, Oil City, Pa.—Hand work and dolls.

Men's Second Prize: A. S. Watson, Oil City, Pa.—Photographs.

Ladies' Second Prize: Esther F. Young, Columbia, Pa.—Knitting. Mrs. Young, a member of the Keystone State Chapter, in Pennsylvania, is probably the oldest Pioneer Association member. She is 92 years of age and is still working in the telephone industry.

President Smith also commended the New Members Committee, of which Mr. Cowan was chairman, for enlisting a record number of new members, and Executive Secretary Workman for her devotion and loyal service to the Pioneer association. He also called upon the oldest Pioneer in attendance at the meeting—W. C. Dillon of Van Nuys, Cal., who started his telephone career in 1895.

The following were elected directors of the association: Foster B. McHenry of Jefferson City, Mo.; Daniel H. McNulty of Chicago, and Genevieve Sauerhage of Springfield, Ill. They succeed Katharine A. Bauer of Jefferson City; J. I. Kennedy of Freeport, Ill., and Mr. Smith, whose terms expired. The directors appointed Paul L. Cowan of Erie, Pa., to the board to fill the unexpired term of H. V. Bozell of New York City, resigned.

The directors elected the following officers: President, F. A. Barnes of Rock Hill, S. C.; vice presidents, Ray Dalton of Everett, Wash., and J. B. Haley of Austin, Tex.; executive vice president and treasurer, Mrs. Workman, and secretary, J. K. Johnston of Indianapolis, Ind.

V V

Buys Texas Independent

It was recently reported that the Knippa (Tex.) Telephone Co. was sold to Andy Anderson. Mr. Anderson was formerly a lineman for the Del Rio & Winter Garden Telephone Co.'s exchange at Devine.

V V

"The real secret of American productivity is that American society is imbued through and through with the desirability, the rightness, the morality of production. Men serve God in America, in all seriousness and sincerity, through striving for economic efficiency."—EDITORIAL STATEMENT, *The (London) Economist.*

Public Relations in Spotlight at Rocky Mountain Meeting

By J. W. BAKER, Secretary-Treasurer
Rocky Mountain Telephone Association

THE SEVENTH annual convention of the Rocky Mountain Telephone Association opened on Sept. 24 at the Newhouse Hotel, Salt Lake City, Utah, with an address of welcome from Gus P. Backman, bureau manager, Salt Lake City Chamber of Commerce.

Association president Mills Roberts, now with General Telephone Co. of the Northwest, formerly with General Telephone Co. of the Southwest, presided at the sessions.

W. K. Koch, president of The Mountain States Telephone & Telegraph Co., spoke on the topic, "Over the Hill." His talk covered many of the problems of and influences on the telephone industry.

As one of the impeding influences, he cited inflation and said:

"Under these (inflationary) circumstances each of us has developed a depreciation reserve to replace the properties now being used up in the public service, and under these inflationary conditions the dollars we are setting aside are nowhere near sufficient to replace the property used. That certainly is bad.

"Beyond that there seems to be no recognition on the part of commissions or on the part of accounting experts or legal experts of the impact of economic depreciation on the operations of all business, but particularly those having high fixed capital such as public utilities."

But, Mr. Koch said, ". . . the country as a whole continues to ask for more and more telephone service. The Independent industry, which had 3 million telephones at the end of 1945, now has over 9 million telephones—a threefold increase—and somewhere in this country within the next four to six months the 50 millionth telephone is going to be installed. . . . So, while more business costs more money and creates some financial problems in providing the capital necessary for the expansion to take care of the demand, over the long pull I am convinced that more customers mean better service for the public as a whole, and a better telephone industry."

He continued, ". . . I am inclined to feel that the telephone is a much greater necessity today than it was even as late as the prewar period. . . . If that is true then a recession or depression cannot have the major impact upon us that has been true in days gone by."

On the subject of rate activity, Mr. Koch said, "Bearing in mind that the average commissioner is a man dependent upon his job for his livelihood and that in turn he is a politician, I think you must come to the conclusion that if for no other reason than self-protection, we must help him in the job of developing and understanding public climate."

To develop favorable public opinion, Mr. Koch advised holding open houses; also making the most of contacts of company personnel with subscribers to discuss reasons why increased rates are needed; and providing speakers and movies for service clubs and organizations.

In conclusion, Mr. Koch touched on future developments which will contribute to improved service—a stackable carrier system to provide up to five channels on an existing line; strides forward in toll dialing; the soldering gun, and the transistor.

Larry Dodds followed the talk by Mr. Koch with a 15-minute film demonstration on microwave, which was found helpful in illustrating the talk, "Over the Hill."

Next, President Roberts reported on the affairs of the association for the past year, complimenting the work of the Committee on Small Company Affairs, which is headed by Chairman T. Clark Callister. The report of the last meeting was read by Secretary-Treasurer J. W. Baker, as well as the financial report of the association.

"The Washington Reporter" was the subject of the address by E. M. Blakeslee, president of the United States Independent Telephone Association, and president of the General Telephone Co. of California, Santa Monica, Cal.

Mr. Blakeslee discussed the various activities of the USITA in representing and protecting the Independent telephone industry.

A major portion of Mr. Blakeslee's address was devoted to recent negotiations on increased Independent compensation for handling interchanged toll business with Bell companies, between the USITA committee and representatives of American Telephone & Telegraph Co.

Opening the afternoon session was a talk by Robert Brown, manager of the Parma (Idaho) Telephone Co. on the subject "Plant Planning and Small Dial Conversion." The Parma company cut over to dial in April of this year.

Mr. Brown cited as reasons for converting to dial: Being prepared to tie into the nationwide toll dialing network; having continuous 24-hour service available, as well as a better grade of service, and improved transmission.

He discussed the several steps in a dial conversion project, which he listed as:

(1) The study of the economic fac-

tors (including rates) and the financing problem.

(2) A survey of present and future line and trunk needs and the selection and ordering of the automatic equipment necessary to take care of these requirements.

(3) Selection of a building site (assuming the existing housing is not suitable), and preparation of building plans.

(4) Inspection of outside plant and preparation of plans for necessary rehabilitation work, well in advance.

(5) Execution of necessary building construction, and installation of central office equipment and subscriber station instruments.

(6) Preparation and distribution of new directories, subscriber telephone operating instructions, and so forth.

(7) Cut-over to the new automatic system.

Mr. Brown mentioned as being very helpful the published study made by the USITA Plant Committee, titled "Small Office Dial Conversion." He said this booklet is available by writing United States Independent Telephone Association, 411 Munsey Building, Washington 4, D. C.

The films "Longer Pole Life with Increased Safety" and "Right-of-Way Brush Control" were shown for the Osmose Wood Preserving Co., Buffalo, N. Y. They were deemed well worthwhile and were enjoyed by the members.

The second day's general session was opened with an address, "Our Operators Should Know Our Business," by R. P. Sullivan, general traffic superintendent of General Telephone Co. of the Southwest, San Angelo, Tex.

Mr. Sullivan said "an informed employe group is one of our company's greatest assets." He outlined a plan for bringing about an informed personnel group, saying it should begin with a series of meetings to be held in the exchange and so scheduled to make it possible for every employe of a department to attend. The objectives of the meetings would be to:

"(1) Provide the employes with information concerning their company and its organization.

"(2) Acquaint them with the company's growth, development, and advancement.

"(3) Familiarize them with the company's plans for the future.

"(4) Create a sincere interest among the employes in the welfare of the company."

Mr. Sullivan advised:

"When providing information concerning the company and its organization, it would be helpful to review not only the size and make-up of the company, but the reasons for having this type of organization, pointing out the duties and responsibilities of the various departments and not limiting this information to traffic alone (for example), but include similar information in the other departments. If the traffic employes realize the duties and responsibilities of the other departments, they are more understanding of each department's problems and it tends to create closer harmony and cooperation between the various groups.

". . . it is (also) advisable to call special attention to any unusual growth or development, such as dial conversions, installation of intertoll dial equipment, or even extensions to manual switchboards. . . . Information of this kind when given to the operators makes them realize that they are associated with a progressive company and will create a certain amount of pride among the employe group insofar as their company is concerned. . . . The more information they are given concerning the company's plans, the more they feel they are a vital part of the organization."

In following through with his example of the traffic department's need to know more about the telephone business, Mr. Sullivan concluded:

"Traffic employes should be made cognizant of the fact that good public relations mean more pleasant working conditions and a more understanding group of subscribers to be served. Subscribers who have a favorable attitude toward the company are more patient and more understanding and the handling of their calls makes the operator's job less fatiguing and much more pleasant. . . .

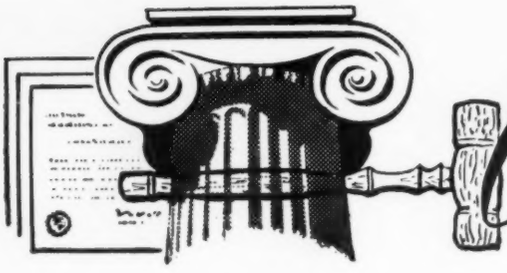
"We should also relate the effect that good public relations has upon our ability to obtain adequate rates which, in turn, has a direct bearing on the wages of those of us employed in the telephone business. . . . The traffic group constitutes the largest single segment of your employe body, and with proper interest and enthusiasm, it can go a long way in helping us cope with the public relations aspect of our operations."

The final address of the convention was given by Harry Diston of the

(Please turn to page 37)

Officers and directors of the Rocky Mountain Telephone Association are (LEFT TO RIGHT, SEATED): VINCENT CHIODO of Tremonton, Utah; D. A. McLEAN of Denver; C. W. HAAS of Bigtimber, Mont.; MILLS ROBERTS of Memphis, Tex.; T. CLARK CALLISTER of Fillmore, Utah; J. W. CORBIN of Moab, Utah, and J. W. (DICK) BAKER of Coeur d'Alene, Idaho. LEFT TO RIGHT, STANDING: GEORGE STONER of Lincoln, Mont.; FLOYD REYHER of Haxtun, Colo.; J. F. THIELE of Pagosa Springs, Colo.; J. F. MONSEN of Aberdeen, Idaho, and R. A. MANUEL of Browning, Mont. Directors not present in picture: WARD BLAZZARD of Kamas, Utah; J. E. TIPTON of Espanola, N. M.; HARRY BEAN of Cascade, Idaho, and OSBORNE LOW of Afton, Wyo.

Shown at the speakers' table during the Rocky Mountain Telephone Association convention are (left to right): J. W. BAKER, association secretary-treasurer; MILLS ROBERTS, retiring association president; W. K. KOCH (speaking), president of Mountain States Telephone & Telegraph Co., and E. M. BLAKESLEE, United States Independent Telephone Association president at the time.



Courts and Commissions

North Carolina Commission Refuses REA Loan Permission

The North Carolina Utilities Commission on Oct. 22 refused a request of the Mebane Home Telephone Co. for permission to borrow $605,000 from the Rural Electrification Administration.

The company sought the loan for building a new central office at Mebane and 19 miles of new line to improve service for its 930 present customers; and also for building a new central office at Prospect Hill and erecting 236 miles of additional lines to serve 749 new customers in parts of four counties.

In denying approval of the proposed loan, the commission said it feared the company's plans were too ambitious and that it was taking on more of a loan than it could handle. It said the proposed program for expansion in the Prospect Hill area was "not compatible with the public interest in that it is not a feasible project."

It said the Prospect Hill project would be "more of a burden than the Mebane area can reasonably support" and would require "that the Mebane telephone rates be approximately doubled."

Its decision, the commission said, was a result of "many conferences during the past four years" with the company and Prospect Hill residents. It denied "without prejudice" the application for approval of the pending REA loan, and said that if the company wishes, it can revise its expansion plans and resubmit the application.

V V

Two Companies Petition to Buy Indiana Independent

Both Union Telephone Co., Greenfield, an Indiana Bell Telephone Co. subsidiary, and the Hancock Rural Telephone Corp., Greenfield, recently applied to the Indiana Public Service Commission for authority to buy the Charlottesville Switchboard Co.

The Hancock company also has applied to the commission for authority to borrow $275,000 from the Rural Electrification Membership Corp. (made up of REA electric co-ops). Funds would be used to buy the Charlottesville exchange and expand services, the Hancock company states.

Helping represent the cooperative is Hugh E. Abbett, who, as chairman of the former Democrat-dominated commission, voted to give the Hoosier Telephone cooperative authority to take over 13 western Indiana exchanges which were part of the John T. Detchon estate (TELEPHONY, Feb. 7, p. 25; Oct. 10, p. 38).

R. R. Hirschman, president of the Union Telephone Co., said the Union company has an option to buy the Charlottesville exchange and negotiations to purchase it now are under way.

"The Union Telephone Co. is willing and able to provide Charlottesville with good telephone service. Under present plans, our company also would provide telephone service with the Greenfield exchange, thus linking the telephones of the two communities, whose interests are closely allied."

State Public Counselor James T. Robison said he will continue to oppose the Hancock County co-op on the ground its financing program is financially unsound.

Counselor Robison charged that most of the $275,000 the cooperative hopes to borrow for the Charlottesville purchase actually is scheduled to make needed improvements in its exchanges at McCordsville, Willow Branch, Maxwell, Mohawk and Eden.

V V

Pennsylvania Independent Asks $6,340 Annual Rate Raise

The Delmont Rural Telephone Co. Export, has asked the Pennsylvania Public Utility Commission for a $6,340 annual rate increase.

The company said it needs the added revenue to meet higher operating costs.

Delmont Rural Telephone serves approximately 577 subscribers in the Delmont-Slickville area.

The proposed rate increases are: One-party residence, from $3.00 to $4.25; four-party, from $2.00 to $3.00. One-party business, from $4.00 to $5.75; multi-party business, from $3.00 to $4.00.

Three Oklahoma Independents Gain Rate Increase

Three Oklahoma telephone companies were granted higher rates in orders of the Oklahoma Corporation Commission issued on Oct. 12 and 13, B. Richardson, telephone engineer of the commission, reports. The following are the approved schedules:

Davenport Telephone Co.:	
One-party business	$4.25
Rural business	3.75
C.B. kick coil, business	.50
One-party residence	3.00
Two-party residence	2.50
Four-party residence	2.00
Multi-party rural residence, metallic	2.75
Multi-party rural residence, grounded	2.25
Handset, desk type	.25
C.B. kick coil, residence	.50
Skeedee Telephone Co.:	
One-party business	3.00
One-party residence	2.50
Two-party residence	2.00
Multi-party rural residence	2.00
Salina-Spavinaw Telephone Co., at Salina:	
One-party business, wall	4.25
Rural business, switched	3.50
Handset, desk type	.25
One-party residence	2.75
Two-party residence	2.25
Four-party residence	2.00
Rural residence, switched	1.75
Multi-party rural residence	2.75
C.B. service	.50
Salina-Spavinaw Telephone Co., at Locust Grove:	
One-party business, wall	4.25
Rural business, switched	3.50
C.B. service	.50
One-party residence	2.75
Two-party residence	2.25
Four-party residence	2.00
Multi-party rural residence	2.75
Rural residence, switched	1.75
Handset, desk type	.25
Salina-Spavinaw Telephone Co., at Spavinaw:	
One-party business	4.25
Rural business, switched	3.50
One-party residence	2.75
Two-party residence	2.25
Four-party residence	2.00
Multi-party rural residence	2.75
Handset, desk type	.25

V V

Louisiana Rate Plea

The Louisiana Public Service Commission on Oct. 19 was to have heard the application of the General Tele-

phone Co. of the Southwest, San Angelo, Tex., for an increase in rates for service at the company's various exchanges in Caddo and Webster parishes.

V V

General of Illinois Petitions Raise Raise, Purchase OK

The Illinois Commerce Commission scheduled an Oct. 20 hearing on the application of the General Telephone Co. of Illinois, Springfield, to sell 2¼ million dollars worth of 30-year first mortgage bonds, 94,160 shares of no par common stock and a five-year promissory note in the amount of $1,600,000.

The General company also petitioned to acquire 14,994 common stock shares of Illinois Allied Telephone Co., Princeton, and to acquire the Illinois Allied company's properties in exchange for stock (TELEPHONY, Jan. 3, p. 34).

The General company also applied for a certificate of convenience and necessity to operate in the area heretofore served by the Illinois Allied company, and the latter company applied for authority to sell its properties to General Telephone of Illinois, and to dissolve.

V V

$4,011,040 Colorado Rate Raise Approved for Mountain States

The Mountain States Telephone & Telegraph Co. on Oct. 9 was granted a statewide increase in rates, amounting to $4,011,040 annually by the Colorado Public Utilities Commission. It is expected the increase would be effective Nov. 1 (TELEPHONY, Oct. 10, p. 46).

The authorized increase amounts to about 11.7 per cent, John H. Winchell, commission chairman said, slightly more than half of the almost seven-million-dollar increase in gross revenues requested by the company.

The commission also raised the company's authorized rate of return from 6.35 to 6.69 per cent, considerably less than the 8.33 per cent return asked by the company.

The 6.69 figure, the commission said, is sufficient to enable the company to maintain its credit and attract new capital.

Andrew Horan, Mountain States' Colorado general manager, said he was "naturally disappointed" the commission did not grant the total amount requested. He said a new schedule of rates would be filed with the commission within a week or so, to become effective when the commission's 21-day waiting period expires on Oct. 30.

The latest rate increase brings to more than $9,561,000 the amount of additional revenues granted by the commission in the last 18 months. The company won a $5,550,000 rate raise in June, 1952.

In handing down its decision, the commission found that the company's net Colorado investment was $74,879,070, and that a 6.9 per cent rate of return would require earnings of $5,009,410. As of last Apr. 30, the commission said, the actual earnings were $3,536,198.

Mountain States will keep only 36.73 per cent of the authorized increase, the $1,473,212 required to bring its earnings up to the 6.69 per cent rate of return. Taxes and wage increases will consume $2,537,828.

V V

Illinois Commission Approves Increases for Three Companies

The Illinois Commerce Commission on Oct. 21 granted rate increases to three telephone companies.

North Harwood Telephone Co., Ludlow, was given permission to raise rates to give the company a net return of $101 a year. The commission said the firm had a $596 deficit last year.

Monthly rates of the North Harwood company for all types of residence and business service have been $1.50, according to Vincent McCabe, secretary-treasurer.

The company asked for raises because they were needed to meet higher operating costs, he said. The company has 115 subscribers.

* * *

Equality Telephone Co., Inc., won authority to increase rates to a point which will give it a 1 per cent return on company value, it was reported.

* * *

Mt. Pulaski Telephone & Electric Co. was granted a $15,000 annual rate increase (TELEPHONY, Aug. 29, p. 36).

ENLIGHTENMENT

"If we are truly enlightened then we should have learned the most important lesson these past twenty-odd years have taught—that private enterprise is not really private at all. No . . . in our democratic society business must rise or fall in the degree to which it serves the public and the public interest. Therefore, either we regulate ourselves to that purpose or we will be regulated."—LELAND I. DOAN, *president, Dow Chemical Co.*

North Carolina Company Asks A Four-Exchange Rate Raise

The Hickory Telephone Co. on Oct. 16 asked the North Carolina Utilities Commission for permission to increase by $104,724 a year the rates at its Hickory, Hildebran, Granite Falls and Valdese exchanges. The company also petitioned for an increase of its rural mileage charges by an estimated $7,787.98 a year.

The Hickory company said the new rates are necessary to offset increased operating costs and to keep its rate of return in line with additions being made to its lines and facilities.

The proposed mileage rate charged rural subscribers outside of the base rate area would be increased from 40 to 63 cents for each quarter mile.

The proposed increases would set the rates at the company's four exchanges as follows:

Hickory	*Present*	*Proposed*
One-party business	$6.50	$9.50
Two-party business	5.00	6.50
Five-party business	3.75	4.50
Ten-party business	...	3.25
One-party residence	3.75	6.50
Two-party residence	2.75	3.50
Five-party residence	2.00	2.50
Multi-party residence	...	2.25
Granite Falls		
One-party business	4.00	6.50
Two-party business	3.00	5.00
Four-party business	2.50	...
Five-party business	...	3.75
Ten-party business	...	3.00
One-party residence	2.75	3.75
Two-party residence	2.25	2.75
Five-party residence	1.75	2.00
Multi-party residence	...	2.00

Hildebran	*Present*	*Proposed*
One-party business	$7.50	$9.50
Two-party business	6.00	6.50
Five-party business	4.50	4.50
Ten-party business	3.25	3.25
One-party residence	4.25	6.50
Two-party residence	3.25	3.50
Five-party residence	2.50	2.50
Ten-party residence	2.25	2.25
Valdese		
One-party business	4.50	7.50
Two-party business	3.50	5.50
Four-party business	3.00	...
Five-party business	...	4.00
Ten-party business	...	3.00
One-party residence	2.75	4.00
Two-party residence	2.25	2.75
Five-party residence	1.75	2.00
Multi-party residence	...	2.00

V V

Nebraska Company Asks Sale OK

The Alvo Telephone Co. recently asked the Nebraska Railway Commission for authority to sell its properties, effective Nov. 1. Frances W. Chase, present owner, said the company is negotiating the sale to William L. Davis.

Reasonable Return Asked by NW Bell in Minnesota

The Minnesota Railroad & Warehouse Commission has set a Nov. 17 hearing on the Northwestern Bell Telephone Co.'s application for an order establishing fair and reasonable rates for all classes of service furnished by the company within the state.

In the application, no definite rate schedule was asked, but Carl O. Lindeman, the company's Minnesota vice president and general manager, said that, based on present costs, a raise averaging 2 cents a day for each telephone in the state would provide the additional earnings needed for a reasonable return and new construction.

The company won its fifth post-war increase last January but said it was not enough to raise earnings in the state over 4 per cent (TELEPHONY, Jan. 24, p. 28). It said present earnings are "much too low."

Inflationary conditions were cited in Northwestern Bell's plea as having increased the costs of materials, equipment and labor required to provide additional telephone facilities so that the company's investment per telephone has been affected to a marked degree.

The company stated that in 1946 the average investment for each Minnesota telephone was $186. Higher prices pushed the average investment on the 275,000 telephones added since 1946 to $332. For the immediate past 12 months, the average investment for each telephone added is stated to be $464, the rate application said.

The application went on to state that previous rate increases have been insufficient to offset the effect of inflation and to enable the company to earn an adequate return. This year necessary wage increases are adding 1½ million dollars annually to operating expenses. Taxes now amount to $2.59 per month for each Minnesota telephone, the highest they have ever been. Building costs are up 57 per cent since 1946, copper wire, 147 per cent, and telephone truck prices have increased 64 per cent.

The company's plea stated that it foresees a continuance of the public demand for more and better telephone service to about the same extent as it has been experiencing. This will require that the company raise large amounts of new capital from investors over the next several years if it is to continue the expansion and improvement of its services in Minnesota.

Stating that successful financing cannot be accomplished unless the company's rate of earnings is sufficient to attract new capital, the company's application asks the commission for a fair and reasonable return on its Minnesota investment.

V V

Wisconsin Company to Issue $50,000 in Common Stock

The Fountain City Telephone Co. Inc., was recently granted permission by the Wisconsin Public Service Commission to issue $50,000 in common stock for a $233,810 dial conversion project.

Frank M. Clark, company manager, said that the authority for capitalization and improvements was granted by the commission on Oct. 1.

Approximately 1,512 shares of the stock, with a par value of $25 per share, are required as equity holding in the provisions of the company's $196,000 REA loan.

The Fountain City company will erect an office and exchange building to accommodate the new equipment.

V V

Pennsylvania Company Gets Paystation Rate Increase

The Pennsylvania Public Utility Commission recently authorized the Murrysville Telephone Co., Export, to increase its paystation charges from five to 10 cents, effective Nov. 1 (TELEPHONY, Oct. 3, p. 37).

The commission said the increase will bring the company an estimated $587 in additional annual revenue.

V V

N. C. Independent Wins $1,881 Annual Rate Raise

The North Carolina Utilities Commission on Oct. 16 authorized the Andrews Telephone Co. to increase its rates an estimated $1,881 a year to offset rising expenses and to earn a fairer rate of return.

The Andrews company has 72 business, 281 residence, and 77 rural subscribers. For the 12 months ending last June 30, the company earned a return of 1.64 per cent. The increase approved is expected to increase its rate of return to 6¼ per cent.

There was no opposition to the request.

One-party residence rates will be raised from $3.00 to $3.25; two-party from $2.50 to $2.75; four-party from $2.25 to $2.50; and rural multi-party from $2.00 to $2.50.

Business rates will be increased from $5.00, $4.25, $3.50, and $3.00 to $6.00, $5.25, $4.50 and 4.00.

"That Brickston is shrewd. He tells them his troubles and they forget their complaints!"

V V

Kansas REA Cooperative Buys Two Companies

The Kansas Corporation Commission on Oct. 21 approved purchase of Winsted Telephone Co., Ulysses, and the F. & M. Telephone Co., Inc., Ulysses, by the Pioneer Telephone Association, Ulysses (TELEPHONY, Oct. 10, p. 48).

Commission Chairman Jeff Robertson said the REA cooperative was granted authority to serve portions of Grant, Stevens, Seward and Morton counties.

Mr. Robertson also said the service will be changed to dial from the present magneto type.

Several months ago the commission denied Pioneer's application to buy these exchanges, plus those at Syracuse, Johnson and Coolidge.

V V

General of Southwest Asks Oklahoma Rate Raise

The General Telephone Co. of the Southwest, Dallas, Tex., has requested a rate increase for 20 Oklahoma exchanges on which the Oklahoma Corporation Commission was to have held hearings on Oct. 22 and 23.

The company is asking an increase of one-party business rates from $8.25 to $9.25, and one-party residence rates from $4.50 to $5.50.

V V

Wis. Commission OK's Note Sale

The Price County Telephone Co., Phillips, recently received authority from the Wisconsin Public Service Commission to issue $90,000 in promissory notes and $40,000 in common stock to retire current indebtedness and pay for plant improvements.

Microwave Principles

(Continued from page 19)

space instead of along wires, the carriers and navigational radio services would interfere with each other. In fact, ship radio service sometimes interferes with carrier anyway, in spite of the fact that the latter is using its own wires.

The use of the word "carrier" comes from the conception that the radio frequency wave carries the voice signal along with it. The term applies to both transmission over wire lines and to transmission of radio through space. This, again, is an example of the natural relation of microwave to telephone systems. A telephone system may use a carrier frequency of 150 kilocycles. If this frequency is stepped up to 900 megacycles, that becomes the new carrier frequency, and also happens to become microwave.

Actually, microwave systems operate on just this principle. Ordinary carrier currents are raised to a new carrier frequency and sent over the air instead of over wires.

Modulation

The process of mixing a voice with a high frequency current in the transmitter is called "modulation." Each radio transmitter, or carrier channel transmitter, contains a device called a "modulator" which is used for this purpose. In radio equipment, this device may be built of vacuum tubes. In telephone carrier equipment, it may use tubes, crystals or varistors.

The act of separating the voice from the high frequency and voice currents at the receiving end is called "demodulation" or "detection." Devices which do this are accordingly called demodulators or detectors, and are also constructed of tubes, crystals or varistors.

There are presently available for the use of telephone companies a number of different types of equipment which operate in the 900-megacycle region. While all are designed to accomplish the same result, different methods of achieving this result are used.

The principal difference in the equipment of different manufacturers is the method of modulation used. While the purpose of modulation is to get the voice signals onto the high frequency current which will carry it to its destination, there are different ways of doing this job.

Amplitude Modulation. This is the method used by standard broadcast stations, telephone carrier systems and others. "Amplitude" in this case refers to the amplitude of the voltage of the high frequency being used as a carrier. In this system, the voice signal is made to cause the high frequency voltage to raise and lower in step with it. Roughly stated, this might be regarded as a case of the louder the speech, the higher the voltage being sent out by the carrier or radio station.

On an ordinary telephone line, the voltage varies with the speech. In a carrier or radio system, the voltage on the antenna or land line varies with the speech, only instead of direct current, the carrier or radio uses high frequency alternating current.

Electrically, amplitude modulation of a radio frequency current by a voice frequency current is accomplished by mixing the two by means of transformers. If no speech is being transmitted, the radio frequency current is sent out at a steady voltage. When speech is sent, the voltage from the speech is added to the radio frequency voltage. Therefore, as the vibrations of speech cause the voltage of the speech circuit to raise and lower, the radio frequency voltage is raised and lowered accordingly.

When this type of signal is received, it is demodulated. That is, the high frequency carrier is removed, and the voice frequency delivered as a varying voltage to the receiver or loud speaker.

This method of using variations in the amplitude of a voltage, then, is amplitude modulation.

Side-bands. When a voice frequency is added to a radio frequency as described above, another action in addition to the varying voltage appears. As a result of the addition and subtraction of the voice frequency to and from the carrier frequency, two new frequencies are obtained. One is the sum of the carrier and voice frequencies; the other is the difference between the two.

For example, if a carrier frequency of 100,000 cycles is modulated by a 1,000-cycle tone, the output of the system will contain frequencies of 101,000 cycles, 100,000 cycles and 99,000 cycles. These frequencies are called upper side-band, carrier, and lower side-band respectively. Thus, it will be seen that in order to send a tone of 1,000 cycles, it is necessary to vary the radio wave in the amount of 2,000 cycles (101,000 minus 99,000 cycles). This sum of the two side-bands is called "band-width" and is an important item in both carrier and radio systems. The higher the voice frequencies transmitted, the wider will be this band-width, which means fewer systems or stations can operate in a given frequency range. Telephone carrier systems usually limit speech frequencies by means of filters to about 3,000 cycles. This makes narrow side-bands, and permits more channels in a system.

Another practice employed in carrier systems, overseas radio stations and other services is the use of single side-band transmission. In the example cited above, it can be seen that the signal information, a 1,000-cycle tone is present in both side-bands, but not in the carrier. Because the tone can be recovered in a receiver from either side-band alone, the other side-band and the carrier can be suppressed in the transmitter and never sent out.

This results in saving in both power and band space. A small amount of carrier frequency is necessary at the receiver so that the demodulator in effect can subtract this frequency from the side-band frequency in order to recover the original signal. In single side-band systems this carrier is supplied by the receiving equipment.

Frequency Modulation. Another method of transmitting intelligence over a high-frequency radio wave is by causing the frequency of this wave to vary with the voice sounds, while the voltage remains constant. A number of methods exist for doing this. Typically, they operate by changing the reactance in the circuit which generates the radio frequency.

The starting point in any radio system is the oscillator—a vacuum tube which is made to function as a generator of high frequency currents. Like any tuned circuit or filter, an oscillator tube is connected to coils, condensers or crystals which resonate at a definite frequency. In a coil-condenser combination, if either of these components is changed in value, the frequency of the oscillator will change.

In a frequency modulated transmitter, another vacuum tube is connected in such a manner that any changes in the current in this tube will alter the frequency of the oscillator tube. The current in this tube can be made to change by putting a voice current into it.

It is easier to build stable oscillator circuits at low frequencies than at high frequencies. Therefore, a radio signal is usually generated at a lower frequency than required, and then sent through multiplier stages, which may double, triple or quadruple the frequency before it is sent out from the antenna. These multipliers consist of tubes and tuned circuits.

Now, if the frequency of the oscillator is being changed by the application of voice currents, the amount of this change in frequency will be multi-

plied also as it passes through the multiplier stages. The transmitted frequency, then, can vary widely. This results in a larger band-width than with amplitude-modulated systems. However, the amount by which the transmitted frequency swings, compared with the voice frequency which generates the swing, can be controlled in the design of the equipment, and band-widths may be kept within required limits. The amount of this frequency change is called "deviation." Typically, a telephone carrier microwave system operating at 900 megacycles may have a swing of 150 kilocycles when frequency modulation is used.

Frequency modulation has a principle advantage over other methods in that it has a low noise characteristic. Most static and man-made noise is amplitude modulated in character, and is not received on FM receivers which are designed to respond to frequency changes only.

Both AM and FM may be used together in telephone microwave systems. In a typical arrangement, voice frequencies from a number of trunks are sent into a carrier system which is part of the radio system. In the carrier equipment the voices are amplitude modulated on to carrier frequencies of perhaps 10 to 150 kilocycles.

These frequencies may then be sent into the radio portion of the circuit where they frequency-modulate an oscillator. The resultant changing frequencies are multiplied, amplified and sent out into space as microwaves. At the receiver the reverse takes place. The microwave frequencies from the antenna are first demodulated to a frequency of 150 kilocycles or less, then further demodulated by the carrier equipment to recover the voice signals, each on its separate channel.

Pulse Modulation. Microwave installations have seen a wide application of pulse modulation. This type of modulation may in itself consist of several kinds, such as pulse time modulation, pulse position modulation, pulse amplitude modulation, etc. This type of operation involves circuit components which differ somewhat from those usually found in carrier or ordinary radio construction, and it is a complete subject in itself, which would require more space than can be given here.

However, an idea of the operational principle may be obtained from a short description of the pulse time system, which is also called "time-division multiplexing."

In this system an electronic circuit rapidly scans, or "samples" each of the many conversations which are being transmitted. A small sample, or pulse of a few millionths of a second in duration, is taken from a conversation and transmitted over the radio path. The circuit then moves on and transmits a bit of the next conversation and then the next, and so on until it returns to the first conversation. So rapidly does the circuit switch from one conversation to another that no interference is noticed by the subscriber.

Thus the pulse system separates the conversations in time, by sending each one at a different time, while FM, or frequency division multiplexing, separates them in space—by using a different frequency space for each. Each method has its advantages and disadvantages and each has its adherents.

Band-width requirements for a pulse modulation system, it may be noted, are considerably greater than for a comparable AM or FM system. For example, where an FM system for a particular application may use a band-width of up to 700 kilocycles, a pulse system may require a band-width of as much as 5,500 kilocycles.

The next article in this series will discuss telephone signaling methods on carrier and microwave, repeaters, transmission problems, compressors and expandors.

In the Nation's Capital

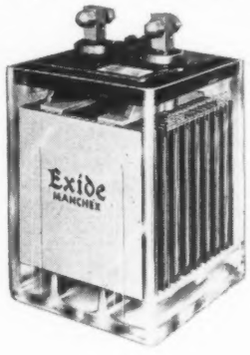
(Continued from page 14)

opposition is in a good position to claim "prejudice." Actually, those who honestly believe in the enterprise system will see this for the sophism that it is. If we start with the assumption that our private enterprise system is right and just, there is no more reprehensible prejudice about Manion's calling TVA a "mistake" than there is about a man admitting he is prejudiced in favor of the Ten Commandments, or against murder.

TVA, for all its extenuating circumstances was an economic crime against our enterprise system, if one really wants to be coldly logical and honest about it. Dr. Manion is coldly logical and honest and could give his TV questioner no other answer than he did. But obviously Manion is no politician.

So, what happens now? Best bet is that Ike will not fire Manion from the intergovernmental relations commission. But he can get Manion and his administration off the hook of political criticism about pre-judgment of issues, by simply removing TVA from the agenda of Manion's commission.

He has a perfectly good alibi to

Construction
With the Double
and America's
Exide-Manchex
telephone batteries


assure
positive operation
For Central Office
and Private Branch
Exchange Equipment
This is proven daily in exchanges of every
. . . for over 60 years Exide Batteries have
serving the Telephone Industry . . . the M
chester positive plate with its exclusive but
type construction provides exceptionally l
life . . . latest developments on molded g
jars permit compact space saving installat
. . . heavy terminal posts with copper ins
provide extra conductivity for sustained
age at high discharge rates . . . micropor
rubber along with slotted plastic separat
are impervious to chemical and electrical
actions . . . plastic spacers assure plate al
ment . . . for assured dependability, long
and low-cost maintenance use Exide Manch
The Electric Storage Battery
Philadelphia, Pa.
1888 . . . Dependable Batteries
for 65 Years . . . 19
STROMBERG
Telephone
CARLSON
TELEPHONES, SWITCHBOARDS

Materials and Supplies . . .

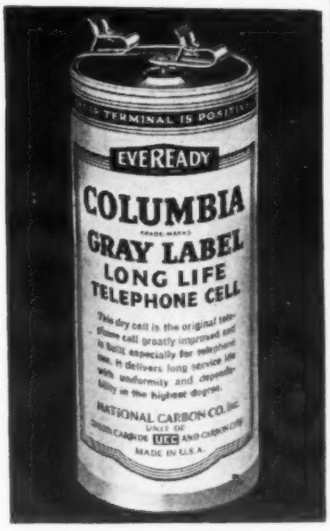
Guarantee of Stromberg-Carlson
Leading Manufacturers . . .

long life telephone dry cells

"Eveready" "Columbia" "Gray Label"

Higher sustained voltage . . . longer life . . . rock-bottom economy—these qualities are assured through the constant supervision of America's largest dry battery laboratory.

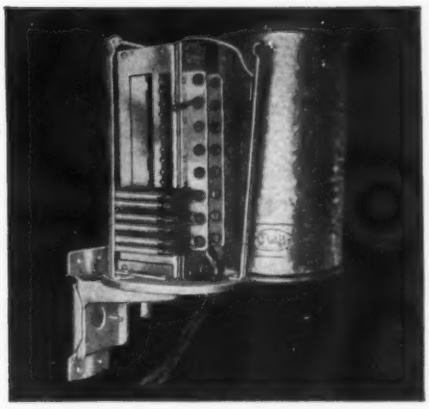
Made by the makers of the famous "Eveready" "Air Cell" Operators' Transmitter Batteries.



THE QUALITY CELL PREFERRED BY TELEPHONE ENGINEERS

cook type S-20

pole cable terminal



Can be used as a protected or unprotected terminal. Made in 6, 11, 16, or 26 pair capacity.

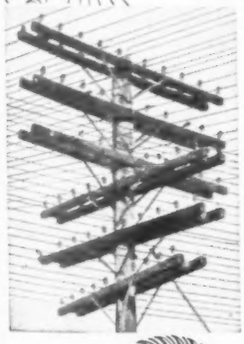
Cook Type S-20 Pole Cable Terminals are carefully engineered to offer the user:

MAXIMUM ECONOMY—because Cook Type H 20 Protector Units, containing fuses and primary and secondary lightning arresters, are added only as they are required.

MAXIMUM CONVENIENCE for installation and servicing. Drop wire connections are at front. Drops are led through individual insulating knockout holes. Self-soldering nozzle lies close to pole. Hood locks in raised position for working. Separate mounting bracket eliminates gaining of pole and provides easy installation.

MAXIMUM PERFORMANCE when used separately or as part of the Cook Trans-Mount System of Protection and Distribution. S-20 is of all steel construction, hot galvanized. Complete terminal designed for maximum insulation.

"dependable" *means both the trade-mark & the guarantee of cross-arms by* American Cross-Arm Inc.



The finest pole and wire installation is useless if cross-arms fail. "Dependable" Cross-Arms are all that the name implies—made of sturdy, American woods, long seasoned, fashioned and finished to stand every weather condition from desert heat to mountain blizzards.

In Douglas Fir—Creosoted Yellow Pine or Gulf-Red Cypress.

Distributed by STROMBERG-CARLSON

ROCHESTER • CHICAGO • ATLANTA • KANSAS CITY • SAN FRANCISCO • TORONTO

SOUND EQUIPMENT AND ELECTRONIC CARILLONS • INDUSTRIAL, INTERCOMMUNICATION SYSTEMS • TELEVISION, RADIOS AND RADIO-PHONOGRAPHS

CUT COSTS

WITH TIMESAVING

GREENLEE TOOLS

...push pipe underground with a
GREENLEE PIPE PUSHER

Here's the quick, simple way to install underground pipe. With the GREENLEE Pusher *one man* pushes pipe *under* streets, walks, railways, lawns, flooring. No tearing up of pavement...eliminates extensive ditching, back-filling, tamping, tunneling, repaving. Cuts job time to a fraction. Two models to fit your jobs exactly—hand or power-pump operated.

Other GREENLEE tools for telephone work . . .

Do the job faster, better with high quality GREENLEE Car Bits for pole work . . . Electricians' Auger Bits of special design for electrical installation work . . . Bell Hangers' Drills of the "Feeler Bit" type . . . Expansive Bits for boring ½" to 4" holes . . . and GREENLEE Angle-Screw Drivers which eliminate pre-boring for angle-screw installations.

MACHINERY & TOOLS
GREENLEE

Get facts on timesaving Greenlee tools. Write Greenlee Tool Company, 2070 Columbia Ave., Rockford, Illinois.

create a special study commission on TVA. How about that? Tennessee's own Democratic Governor Clement asked him to appoint one. So that is probably what Ike will do. And if the political "know how" is functioning extra smart, the chances are the special commission will be asked not to bring back its report until after the Congressional election campaign of 1954.

This sort of compromising is very galling to those of us who would like to meet this socialistic issue head on and expose it for what it is—a sneaking cousin of communism. But smart politics demands its own price these days from thoughtful persons who must keep in mind the over-all stakes of the American people. Ike cannot purge us overnight of a socialistic infection which has been growing in our body politic for two decades.

What Happened to NPA?

Remember two years ago when every telephone man in the country was worrying about where his next shipment of copper wire was coming from, and stuff like that? Last month the word went out from the Commerce Department about a new agency which stirred memories about the old National Production Authority and its Communications Equipment Division.

The word was that the so-called "Business and Defense Service Administration" (BDSA) has been confirmed as successor to the old NPA and is now in business as a subagency of the Commerce Department.

This next BDSA has only a remnant of the authority of the former emergency control organization. It will function mainly as a medium of cooperation between government and business in promoting the notion of economic stability. Commerce Secretary Weeks says the new unit will stress teamwork between government and business "through an organized exchange of timely ideas, information, and services."

What is left of defense and mobilization function of the old NPA will be carried on by the new agency. Until a new administrator and three assistants are appointed, H. B. McCoy, veteran Commerce career official will be acting administrator. The old NPA Communications Equipment Division along with the old NPA Water and Sewage Division, NPA Electrical Equipment Division and the old Defense Electric Power Administration (formerly under Interior Department) have been theoretically combined under the new BDSA. But there is no prospect of any early revival of direct contacts with the telephone or other utility industries on the subject of emergency control of materials. As a matter of fact, nickel allocations—the last of the old strategical material controls—were revoked late last month, effective November 1st.

Color TV by Christmas?

FCC Chairman Rosel H. Hyde still thinks there is a good chance that Santa Claus can slip a full blown color television set in your stocking this Christmas. That is, assuming of course, that you can fish around in your pocket and pull out a thousand dollar bill without missing it later.

Anyhow, the FCC membership went up to New York City last week to see the TV industry's demonstration of its new "compatible tube" at the Waldorf-Astoria Hotel. They all came back very much impressed.

"It is not unreasonable to expect that the Commission will approve compatible color TV standards by Christmas" said Hyde. "We're moving as rapidly as the seriousness of the situation will permit."

Compatible color standards would mean that color programs could be seen on present black-and-white sets in monochrome without any additional equipment or adjustment. Several hundred invited guests, including your correspondent, saw the demonstration in New York in the "Starlight Roof" of the plush Waldorf-Astoria.

The program consisted of a Parisian musical number, a song by Nanette Fabray and those whimsical marionettes, Kukla and Ollie plus their girl friend, Fran, who comes through a very beautiful brunette on the new color TV.

Both the National Broadcasting Company and the Columbia Broadcasting System are now in agreement on the use of a "compatible tube." CBS, earlier this year, abandoned its old mechanical technique of a revolving "prism wheel" in front of the home television set. It was very workable but hardly practical under the circumstances of modern mass distribution of TV sets in the United States.

V V

Commission Approves Sale Of Wisconsin Company

Sale of the Home Telephone Co., Richland Center, to the General Telephone Co. of Wisconsin, Madison, has been approved by the Wisconsin Public Service Commission (TELEPHONY, Oct. 3, p. 38).

The Home company served subscribers near Richland Center in the towns of Richland, Dayton, Marshall, Eagle, Orion and Buena Vista.

Rocky Mountain Meeting

(Concluded from page 29)

American Telephone & Telegraph Co., New York, N. Y. Mr. Diston is Independent company relations engineer for that company and his talk on "Long Range Planning for Nationwide Customer Dialing" gave the members a well-rounded discussion on that interesting subject.

A luncheon for the ladies was given through the courtesy of The Mountain States Telephone & Telegraph Co.

The convention elected the following directors:

Ward W. Blazzard of Kamas, Utah; Robert Brown of Parma, Idaho; T. Clark Callister of Fillmore, Utah; Vincent Chiodo of Tremonton, Utah; J. W. Corbin of Moab, Utah; Earle Crandall of Pinedale, Wyo., and C. W. Haas of Bigtimber, Mont.

Also J. J. Kemper of Brownfield, Tex.; D. A. McLean of Denver, Colo.; J. F. Monsen of Aberdeen, Idaho; Floyd L. Reyher of Haxtun, Colo.; J. F. Thiele of Pagosa Springs, Colo.; J. E. Tipton of Espanola, N. M., and M. O. Trego of Sundance, Wyo.

The directors elected the following officers:

President, R. A. Manuel of Browning, Mont.; vice president, C. M. Hart of Kingman, Ariz., and secretary-treasurer, J. W. Baker of Coeur d'Alene, Idaho.

V V

Lincoln T&T Authorized To Sell Promissory Notes

The Nebraska Railway Commission on Oct. 1 granted The Lincoln Telephone & Telegraph Co. permission to sell 2½ million dollars worth of 4⅛ per cent promissory notes.

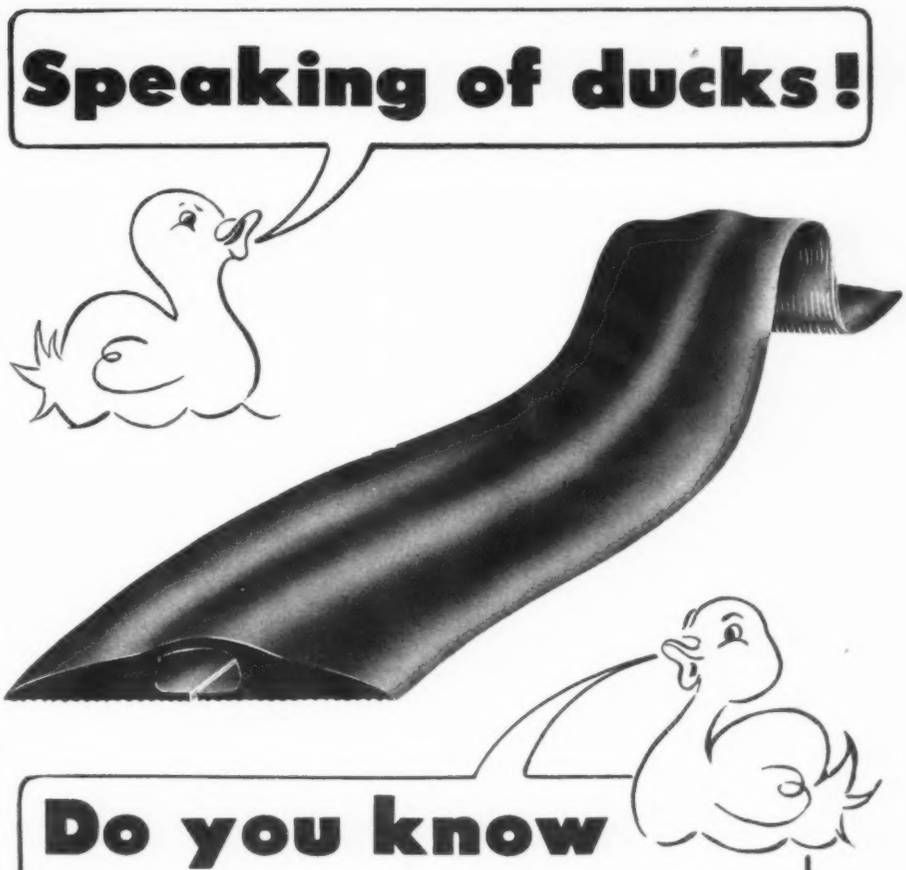
At a hearing on the issue, company officials told the commission that the notes would be used to retire short-term bank loans, and to expand and improve its facilities.

V V

United of Pennsylvania Wins Purchase OK

The Pennsylvania Public Utility Commission recently authorized the United Telephone Co. of Pennsylvania, Harrisburg, to buy the Peters Township Telephone Co., Lemasters.

The Peters Township company served 1[illegible] subscribers who were switched through the United company's Mercersburg exchange.



It's the new rubber floor duct that solves over-floor wiring problems quickly and effectively, with adequate protection from sweepers, mops and equipment on casters. Installation is easy and permanent. You just fasten Flexiduct in place with its own special cement. There's no drilling or necessity to use screws and fasteners. Flexiducts' flexibility allows it to adhere evenly and securely to all types of floor surfaces and it is adaptable for installations ranging from 2 conductors to 25 pair switchboard cables. Write for complete information regarding Flexiduct and your wiring problem today.

For further information, write for circular 753 A.

BUCKEYE TELEPHONE & SUPPLY CO.

1250 KINNEAR RD. COLUMBUS 12, OHIO

Open House In Ohio

(Concluded from page 21)

viding service; a discussion of how money is secured for expansion and improvement; a graph and explanation of the company's tax burden, with the excise tax spotlighted, and a short item on how the company is regulated.

The Warren company, it may be remembered, was the first telephone company in the nation to use punched card accounting for a complete billing job. This event took place in 1947.

A log of comments on the open house by visitors and employes was made for evaluation purposes. The log contained the following responses:

Visitors:

"We sure invested our money with a friendly lot of people."

"I never realized so much took place in a telephone company."

"I was impressed with the efficiency of your operators and to learn of the highly mechanized methods of the handling of telephone billing."

"How do you ever keep account of the multitude of wires in the cables?"

"I can't get over the amount of equipment it takes to provide telephone service."

"After seeing the toll board operation I will be more patient when placing a call."

"Amazed at what you have in the building — the mass bulk wiring was impressive."

"As citizens we are just as proud of this beautiful building as you are and its cleanliness is out of this world."

"It is wonderful for the telephone company to open its plant to the public so we can see what is back of a telephone."

"A revelation—wouldn't have missed it for anything."

Employes:

"Even though I am a switchboard operator, I thoroughly enjoyed the tour of the plant and found it most interesting."

"It's the happiest time of the period of our employment to see this dream come true."

"I am beginning to appreciate what a nice place this is to work—I really enjoy it."

"Everyone feels that this is a wonderful experience for us (employes) and we are not backward about voicing our opinions around here."

"We are mighty proud of this building with its many provisions for our comfort."

The Warren Telephone Co. is headed by Gustav Hirsch of Columbus, president; Mr. Mateer; A. B. Wright, secretary, and A. F. Reed, treasurer.

Special Agent

(Continued from page 15)

cover a period of over four years and comprise some 42,000 folders.

These in turn are supplemented by a cross-index of 5-inch by 3-inch cards, listing the name of every individual or firm concerned in each case. Adding up to some 112,000 cards going back over the 25 years this office has been in operation, this is a valuable locator record as well as a guide to recurrent names.

The case files, in Remington Rand folders, have for years been housed in four-drawer legal size Aristocrat file cabinets, but even this combination was not sufficient for the proper physical control and handling of the papers. A great deal of office time was lost in thumbing through file drawers in search of a particular folder. This was intensified by the normal tendency of file folders to be thicker at the bottom left corner and thus to "slouch" and overlap the tabs.

As a result of analyzing this situation we have been able greatly to in-

24 hour REVENUE
FROM OUTSIDE TELEPHONE BOOTHS
with
ELECTRONIC
Light Watchman
lights on at dusk...
lights off at dawn!
Automatically!
NO SPRINGS TO WIND
PHOTOTUBE OPERATED
STEEL COVERING
COMPLETELY AUTOMATIC
WEIGHS 2 POUNDS
NO MOTORS TO FREEZE OR SLOW DOWN
TELEPHONE
EASILY INSTALLED
No more lost revenue hours when the Ripley Light Watchman automatically turns phone booth light on at dusk, off in the morning. Easily seen from a distance, a lighted booth encourages the timid, especially women, who hesitate to enter a dark booth at night.
AVAILABLE THROUGH YOUR DISTRIBUTOR
Simply installed, thousands already in use throughout the country. The Electronic Night Watchman handles 300-watt load and is available for AC or AC-DC.
ELECTRONIC Ripley CONTROLS
Factory and Engineering Office Middletown, Conn.
ORIGINATOR OF SUNSWITCH LIGHTING CONTROLS
Telephone Middletown 6-6679

SERIES OF BOOKS ON

Foremanship and Supervision

by HARRY C. WALKER, Ph.D., *Plant Training Supervisor*
SOUTHERN BELL TELEPHONE AND TELEGRAPH CO.

In these three books Dr. Walker gives us the fruit of a quarter century of experience as a craftsman, foreman, engineer, supervisor, conference leader and teacher in industry. Written in simple, straightforward English they have been recognized as outstanding manuals for training foremen and supervisors.

★ **ORAL EXPRESSION IN SUPERVISION** is designed to aid the foreman in making talks to his men, leading conferences, teaching industrial subjects and holding interviews. $1.00 each.

★ **THE FUNCTIONAL ELEMENT IN SUPERVISION** is a basic analysis of the foreman's duties. $1.00 each.

★ **THE HUMAN ELEMENT IN SUPERVISION** is an application of the principals of personnel counselling to foremanship. $1.00 each.

TELEPHONY PUBLISHING CORP.
608 SOUTH DEARBORN STREET CHICAGO 5, ILL.

crease our clerks' speed of reference to the files, and substantially to improve the appearance of the drawers as well.

All current and active drawers have been equipped with Flexifile, fabric supportive pockets that compel folders to stand absolutely upright in small groups. Armorclad guides were added, with tabs on the left side of the drawer, to signal each fiftieth number. Locating the wanted folder is now a quick, precise motion. The few seconds that are saved in each reference by the elimination of fumbling, add up to a noticeable weekly time economy that spells increased office efficiency.

After an approximate three-year period, the individual case folders are consolidated into groups of 50 within a single folder. A paper label on the folder tab then enables re-use of the folder, a long-range economy made possible by the quality of the folders.

After about five years, the case folders go to vault storage in wooden boxes, to release needed space in the office Aristocrat cabinets.

Similarly, the efficiency of the cross-index files has been increased by addition of 500-division Variadex guides. Finding a wanted name is much easier within a small group of cards; so simple a thing as more guides at scientifically-planned intervals speeds reference and makes it unnecessary to keep office visitors or telephone callers waiting for extra minutes.

The same type of Variadex guiding is used on the Identification File we maintain, on 5x3 cards, with photographs of 28,000 current and former company employes.

V V

OBITUARIES

CLAYTON LIEBHART, 70, formerly district plant manager of The Lincoln (Neb.) Telephone & Telegraph Co., died on Oct. 17 at a Lincoln hospital.

Mr. Liebhart's telephone career dated back to 1904, when he was employed by the Bell company at Lincoln.

Lincoln T&T purchased the Bell properties in 1912 and consolidated the exchange, and Mr. Liebhart became an inspector in the plant department.

In 1918 he advanced to the position of wire chief and in 1934 became district plant manager at Lincoln. He retired in 1948 and had lived at Lincoln since then.

He was a charter member of the Frank H. Woods Chapter of the Independent Telephone Pioneer Association and a life member of the Casper E. Yost Chapter of the Telephone Pioneers of America.

CLAUDE L. WALKER, 76, retired employe of The Lincoln (Neb.) Telephone & Telegraph Co., died on Oct. 12 at a Lincoln hospital.

Mr. Walker was first engaged in the telephone business in 1899 when he joined the Horton (Kan.) Telephone Co. He later worked for the Northeast Telephone Co. in that community and in 1904 joined the New Home Telephone Co. of Beatrice, Neb.

The Lincoln company purchased the New Home company in 1912 and Mr. Walker became chief testman. In 1917 he was made wire chief and in 1926 moved to Lincoln as maintenance inspector.

He was later district inspector and in 1942 became equipment foreman at Mead. He retired in 1948 and since then had lived at Lincoln and Tallahassee, Fla.

His son Max is district manager of the Lincoln company and another son, Harry, is wire chief of the company at Tallahassee.

Mr. Walker was a charter member of the Frank H. Woods Chapter of the Independent Telephone Pioneer Association.

* * *

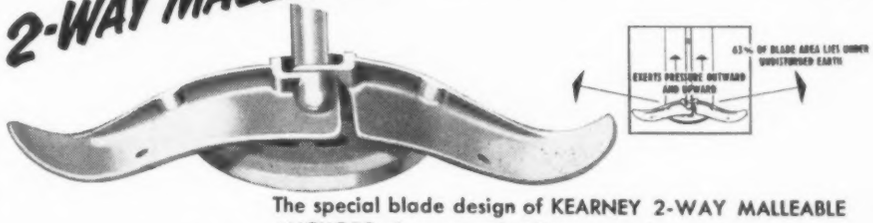
OSCAR O. SHANNON, 57, manager of

NATCO
CLAY CONDUIT

The proved and standard protection for Underground Telephone Cables. Highest quality and full line of shapes.

NATCO CORPORATION
formerly National Fireproofing Corp.
327 Fifth Avenue, Pittsburgh 22, Pa.

For STRENGTH SPEED and SIMPLICITY
GUY TO KEARNEY
2-WAY MALLEABLE EXPANSION ANCHORS!



WRITE FOR PRICES...

The special blade design of KEARNEY 2-WAY MALLEABLE ANCHORS gives extra holding power by exerting outward, as well as upward pressure against the earth. The blades expand easily into the earth with a few blows of the tamping bar. When locked in place, 63% of the anchor blade surface lies under undisturbed earth for maximum gripping power.

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. GUELPH, ONT.

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Ave., St. Louis 10, Missouri
215

FOR BETTER CONSTRUCTION... SAFER MAINTENANCE

the Allendale (Mo.) Switchboard Co., died at his home on Oct. 22.

He is survived by his widow, Mrs. Mae Shannon; a daughter, Mrs. B. Harvey Watson of St. Joseph, Mo.; a brother, Charles Watson of Grant City, Mo., and two sisters, Mrs. Mae Vance of Parnell, Mo., and Mrs. Elizabeth James of Worth, Mo.

V V

Graybar Opens Branch At San Bernardino

The 112th location in Graybar Electric Co.'s nationwide distribution system was opened recently at 655 South "H" St., San Bernardino, Cal., Pacific District Manager S. W. Scott has announced. J. H. Gregerson is manager and R. P. Sager is operating manager.

Mr. Gregerson has been a salesman at Los Angeles since 1947. He joined the company in the operating department at Los Angeles in 1940, becoming office salesman in 1946.

Mr. Sager started his Graybar career in the Los Angeles operating department in 1945. He has been office salesman at Los Angeles and Long Beach and since 1951 he has been head office salesman at Los Angeles.

The company reports the branch was opened in recognition of the increasing demand for electrical products in the San Bernardino area.

V V

Highway Trailer Names Cascone Newark Branch Manager

The appointment of Arthur B. Cascone as manager of the Newark, N. J., branch was announced recently by F. C. Gokey, executive vice president, of the Highway Trailer Co., Edgerton, Wis.

A. B. CASCONE

Mr. Cascone has been active in the trailer sales field for more than 10 years and was formerly associated with the Fruehauf Trailer Co. and the Eastern Textile Co. For the past three years he has represented the Highway Trailer Co. in the Newark branch area. He is a member of the Empire State Highway Transportation Association and the Allied Industries Council.

McELROY Type '5'
FM TELEPHONE CARRIER
A dependable carrier at a price your system can afford
• Proves-in' under 5 Miles
• FM quality transmission
• Self-contained selective ringing
• No expensive common equipment
• 5 additional channels per wire pair
Inquiries invited
McELROY MANUFACTURING CORP.
LITTLETON, MASSACHUSETTS, U. S. A.

V V

Helpful Literature Correction

In the "Helpful Literature" section of TELEPHONY, Sept. 19, 1953, page 41, a line of type was inadvertently left out of the article on Whitney Blake Co.'s new folder on exchange area and inside wiring cable. The third paragraph should have read:

The exchange area cable is a new construction using only copper, polyethylene and aluminum. It is approved by REA. Conductors are bare annealed copper in No. 24, No. 22 and No. 19 AWG. The cable is available in 11, 16, 26 and 51 pairs. The insulation is stabilized polyethylene having low capacitance, high dielectric strength and moisture resistance, assuring efficient operation of the cable even if the outer sheath becomes damaged, the company states.

V V

"There can be no economy where there is no efficiency."—BEACONSFIELD

helpful LITERATURE

GENERATING PLANTS—D. W. Onan & Sons Inc. has issued a "Blue Book" of general information concerning the selection of engine driven electric generating plants. The pocket sized booklet traces the history of electric plant development from early stages where storage batteries were necessary, to today's modern single-unit, engine-generator power plants.

Described in simple, easy-to-understand language are the three general groups of electric plants: Alternating current, direct current, and battery charging. Plant operation for each type is thoroughly discussed.

The booklet reviews the three types of prime movers which furnish the mechanical power for driving the generator, namely: gasoline engine, diesel engine and gas engine. Cost of operation and installation of each type is discussed. Differences of engine cooling are compared, starting methods are described and a concise summary of important points to remember in selection of an electric generating plant is also included. Request HL159.

• • •

INSULATORS—A new eight-page informative catalog listing its complete line of Hemingray communication insulators is being distributed by the Kimble Glass Co., subsidiary of Owens-Illinois Glass Co.

The catalog, a three-color presentation, shows the insulators as they appear in use and with the proper ties and in place on the crossarms.

Hemingray insulators, according to the catalog, represent one of the company's oldest phases of business, having been founded in 1848, four years after Morse built his first telegraph.

The catalog, besides showing photographs of the telephone and telegraph insulators, contains descriptions, recommended end uses, and specifications. Request HL160.

• • •

PRINTING PROCESSES—Successful photo-offset printing and processing procedures for internal printing departments in business and industry are described in a new 16-page booklet available from Minnesota Mining & Manufacturing Co.

Entitled "Executive's Manual," the booklet explains the procedures practiced by internal printing departments in large corporations and small business houses.

The booklet shows how to get the most out of internal printing departments. It lists office and business materials which are typed, written or drawn and provides information on how this material can be reproduced quickly and inexpensively by photo-offset printing.

Plans are given for the most efficient operation of a self-sufficient printing department. These plans include an explanation of offset duplication: the type of printing personnel needed for a shop; description of shop layout and the advantages of using 3M brand presensitized all-aluminum photo-offset plates to achieve high quality printing at lowest cost. Request HL161.

• • •

PLASTICS—Comprehensive information about the properties, test values,

TELEPHONY PUBLISHING CORP.
608 S. Dearborn St.
Chicago 5, Ill.
Please have the manufacturer send me without obligation further information on the products described in the following numbers:
HL159____: HL160____: HL161____: HL162____.

Name.....Title.....

Street.....

Company.....

Town and State.....
10/31/53

ROADSIDE BONANZA!

You'll strike a ROADSIDE BONANZA with more Roadside Pay Stations spotlighted with P and A

Reflectorized P and A TELEPHONE Signs

- Booth and Approach Signs
- Weather Resistant . . . Longer Lasting
- Long-Range Visibility . . . Day or Night
- REFLECTORIZED BRILLIANCE with "Scotchlite" brand Reflective Sheeting.

GET CATALOG
AND PRICES TODAY
TELEPHONE SPRINGFIELD 4-0189

P and A Manufacturing Company
SPRINGFIELD, OHIO

LONG LIFE · CLEAN · DRY · LIGHT WEIGHT

FIR CROSS ARMS

HALEY CEDAR POLES

IMMEDIATE DELIVERY

LOW CONDUCTIVITY AND SAFER WITH PENTACHLOROPHENOL FULL-LENGTH TREATMENT

R. G. HALEY & CO., INC.
SPITZER BLDG. TOLEDO 4, OHIO

new

HOIST FLEXIBILITY

The new Model R Ratchet Lever Hoist features Coffing's time-proved Safety-Pull ratchet-pawl construction — plus coil chain for extra flexibility. Chain wraps in any direction . . . resists rust and corrosion. For ease of servicing, the Model R may be completely disassembled in seconds with only a screw driver. For safety, each unit is tested at 100 percent overload.

For more information on the new, handy Model R, write for bulletin TRG.

COFFING HOIST COMPANY
DANVILLE, ILLINOIS

Quik-Lift Electric Hoists • Hoist-Alls • Safety-Pull Ratchet Lever Hoists • Mighty-Midget Pullers Spur-Gear Hoists • Differential Chain Hoists Load Binders • I-Beam Trolleys

QUALITY • ECONOMY • SERVICE

TELEPHONE
• SWITCHBOARD
• INSTRUMENT
• OPERATORS

CORDS

by Commercial

NYLON • NEOPRENE
MERCERIZED COTTON

• TROUBLE FREE CONDUCTIVITY • LONG LIFE •

Write for Catalog and Samples

COMMERCIAL
CORD and SUPPLY CO., Inc.

MANUFACTURERS OF CORDS FOR ALL MAKES AND TYPES OF TELEPHONE INSTRUMENTS

26 E. Main St., CLIFTON SPRINGS, N. Y.
Phone CLIFTON-SPRINGS 189

molding techniques and applications of Bakelite phenolic plastics is presented in a new booklet published by Bakelite Co., a division of Union Carbide and Carbon Corp.

The 20-page booklet, "Bakelite Phenolic Molding Plastics," offers data of interest to product designers and molders about the five types of Bakelite phenolic molding plastics—general purpose, improved impact, heat-resistant, low-loss electrical and special purpose. More than 30 illustrations show typical products made of these materials.

The booklet has a property data table which lists the values of each type of phenolic when subjected to 24 mechanical, electrical and miscellaneous tests, ranging from compression strength to water absorption. General steps in the production of a molded product from these materials are set forth, along with 15 useful product design recommendations. Request HL162.

V V

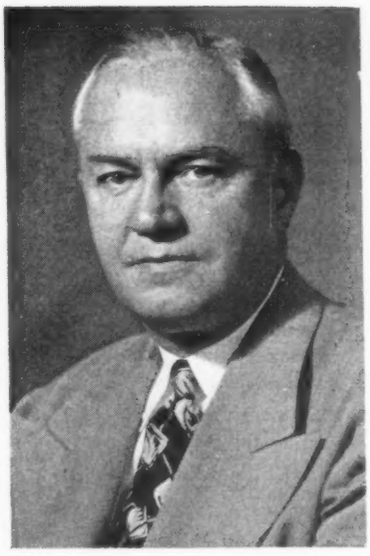
Roemer Named Vice President of IT&T; Perry Federal President

Henry C. Roemer, president of Federal Telephone & Radio Co., has been designated vice president in charge of the administration of the domestic divisions of the International Telephone & Telegraph Corp., it was announced recently. The domestic divisions are

H. C. ROEMER

Federal Telephone & Radio Co., Clifton, N. J.; Federal Telecommunication Laboratories, Nutley, N. J.; Kellogg Switchboard & Supply Co., Chicago, Ill.; Coolerator Co., Duluth, Minn., and Capehart-Farnsworth Co., Fort Wayne, Ind.

Mr. Roemer's successor to the presidency of Federal is Raymond S. Perry who has been vice president and general sales manager.



R. S. PERRY

Prominent in the development of Federal since 1940, Mr. Roemer directed its activities during World War II. For the past three years he has applied his broad experience in han-

INSPECTION SERVICE
Of poles, crossarms, and preservative treatments. Analyses of wood preservatives. Consulting and specification writing. Inspectors stationed throughout U.S.A.
A. W. WILLIAMS INSPECTION CO.
MOBILE, ALABAMA
OVER 30 YEARS EXPERIENCE

Installation Specialists
CENTRAL OFFICES
INSTALLED—MODIFIED—ENLARGED
COMMUNI-CATERING
P.O. BOX 6712 CHICAGO 7, ILL.

TELEPHONE PRINTING
By People Who Know the Telephone Business
SEE THE SUTTLE CATALOG
SUTTLE EQUIPMENT CO.
LAWRENCEVILLE ILLINOIS

35 YEARS PRINTING SERVICE TO THE TELEPHONE INDUSTRY
Tabulating - Easysnap - Teletype - Service Order
Toll Statement - Toll Ticket
Miscellaneous Forms Printng
THE WALLACE PRESS
L. K. GRULEE
CHICAGO - NEW YORK - DETROIT - SAN FRANSICO

SPECIFY TELERING for
Dependable and Economical Telephone Ringing Power Equipment.
Engineered for complete satisfaction.
Manufactured by
TELKOR, INC. Elyria, Ohio

J. E. ALBERT
Engineering and General Consultant
Reports for
FINANCING • PURCHASE • SALE
185 NORTH WABASH AVENUE
CHICAGO 1, ILL.

CYRUS G. HILL
ENGINEERS
PLANT — TRAFFIC — COMMERCIAL
VALUATIONS AND ORIGINAL COST
134 S. LA SALLE STREET, CHICAGO 3

SLOAN, COOK & LOWE
CONSULTING ENGINEERS
Appraisals—Original Cost Studies
Plant, Traffic and Commercial Engineering
120 S. La Salle St.
Chicago 3, Ill. Tel.: FRanklin 2-5924

G. LOUIS WELLER
CONSULTING ENGINEER
1203 Nineteenth Street, Northwest
Washington 6, D. C. STerling 3-1122
Equipment, Plant, Traffic and Management Engineering
Rates Valuations Investigations

ROBERT E. FOLEY CONSTRUCTION CORP.
DESIGN—SURVEYS—APPRAISALS—Construction and Maintenance of Overhead and Underground Telephone Plant. Complete supply of poles available for emergency requirements.
48 GRISWOLD STREET
BINGHAMTON, N. Y. TEL. 2-7215

NEALE CONSTRUCTION CO.
ENGINEERING • CONSTRUCTION • MAINTENANCE
TOPEKA, KANSAS PHONE 4-2621

SOUTHEASTERN ELECTRIC CONSTRUCTION CO., INC.
Contractors for
Complete Communication Systems
ANDALUSIA, ALABAMA
P.O. Drawer 351 Tel. 891

Construction Crews Station Installers
Central Office Installations
Cable Splicers Complete Engineering
HENKELS & McCOY
1418 Baldwin Bldg. Erie, Pa.
Now Operating in 18 States

dling the company's operations in producing a wide variety of electronic and communication equipments, the company states.

Joining IT&T in 1927, Mr. Roemer was made chief accountant in 1930. From 1933 to 1938 he was in charge of accounting and finance for IT&T manufacturing associates in Great Britain and the continent of Europe; in 1939 he also served in Cuba. He was elected a director of IT&T in 1943, a vice president in 1944 and comptroller in 1946. In 1951, Mr. Roemer became president of Federal.

Mr. Perry, who now assumes the presidency of Federal, brings to that post wide experience in the fields of electronics and communications, the company reports. He joined the company in 1949 as general sales manager and since 1951 has, in addition, been vice president and director in charge of all domestic and government sales activities.

As an executive and member of the board of directors of the Olin Industries, East Alton, Ill., Mr. Perry directed the research activity for Western Cartridge, Winchester Repeating Arms and other companies in the Olin group. He also served as a vice president in charge of engineering and sales for the Ingersoll Milling Machine Co., Rockford, Ill.

V V

Ground Broken for Stromberg's Electronics Building

Ground was broken recently in Rochester, N. Y., for an addition to Stromberg-Carlson's electronics engineering building, which will triple the size of the company's facilities for that department.

According to Gordon G. Hoit, Stromberg-Carlson executive vice president, this will not only provide much-needed space for present operations, but also anticipates future requirements for engineering personnel and their activities in any of the many possible areas in the whole field of electronics. This refers particularly, he says, to preparation for the company's expected development in the general electronics business through the pure and applied research being carried on by Electronic Control Systems, Inc., Stromberg-Carlson's new affiliate in Los Angeles.

The new building will provide laboratory and office space, with special attention given to sound-proofing, insulation, and other requisites for electronic research. Engineering development and design work in immediate prospect, according to Charles W. Finnigan, chief electronics engineer, is in radar, communications, and transistor circuits.

Party Line Transmission and Ringing Improved with Vincent Rare Gas Relay

May be Used with Harmonic or Coded Bells

Vincent Rare Gas Relay, RTC-2. Ready for Mounting.

End objectionable noise interference due to transient and induced voltages, and provide additional lightning protection in bell circuits, with the Vincent Rare Gas Relay. Compact, non-mechanical, the Vincent Rare Gas Relay is easily inserted in the bell box, or at the ground connection or protector block on compact handsets, in series with each bell. It needs no further maintenance.

Since the resistance of the relay is practically infinity below 60 volts, its normal breakdown voltage, the line remains normally free from paths to ground. Ringing voltage of 85 volts ionizes the rare inert gases, is transmitted without difficulty.

The Vincent Rare Gas Relay may be used on magneto or common battery lines. Over 100,000 in daily use! Write for details.

BRACH MFG. CORP.
Div. of General Bronze Corp.
200 Central Ave., Newark 4, N. J.

Small Directories Are Very Important
at Donnelley's.
Please feel free to call us about yours. We may be able to help you improve it.
The Lakeside Press
R. R. DONNELLEY & SONS COMPANY
350 East Twenty-second Street
Chicago 16

CLASSIFIED SECTION

Rates 15 cents per word payable in advance. Minimum charge $3.00 for 20 words or less. Classified advertisements must reach us 8 days before publication date.

FOR SALE

ANKOSEAL CABLE
For immediate shipment
16 pair 22 gauge
26 pair 22 gauge

W. E. SPRING JACKS & LAMP JACKS

#193 Spring Jacks

on #122 Mtg.	— 20 per strip	$12.00
on #123 Mtg.	— 20 per strip	12.00
on #125 Mtg.	— 10 per strip	7.00

#12 Lamp Jacks

on #136 Mtg.	— 10 per strip	$5.00
on #122 Mtg.	— 20 per strip	8.00
on #144 Mtg.	— 20 per strip	8.00

TELEPHONE REPAIR & SUPPLY CO.
1760 Lunt Ave. Chicago 26, Ill.

PRICED FOR QUICK SALE—400 wall telephones, 5-bar, Gen. 1600 ohm ringers, $2.00 to $3.00. Park Region Mutual Telephone Co., Underwood, Minn.

FOUR EXCHANGES IN ARKANSAS—one common battery, one dial, two magneto. All in excellent condition. Cash required. No correspondence. If interested, come see them. R. L. Thomas, Standard Telephone Co., Cotter, Ark.

NEW W. E. EQUIPMENT

Sub-Cycle Ringing Generator type M7.5 50/60 cycles	$45.00
F1AW Handsets with /F1 and HA1 capsules	4.75
G2-3 Handset Hanger	6.00
Telephone Headsets: Consisting of type 11 Headbands, 2 ea. 716A Receivers, 1 ea. 5 ft. cord complete with a 289B Plug	6.50
7AW Buzzer (270 ohms)	3.00
684 BA Subscriber Sets (Ringer Box)	6.35
7AW Ringer Bell	3.75
Protector Box 1093AW	1.85
4 Cell Battery Case type 2A	3.00
165745G-2 Ground Clamp	.50

METROPOLITAN TELEPHONE SUPPLY CORP.
254 Navy St., Brooklyn 1, New York

REBUILT REFINISHED GUARANTEED

W.E. #5H Dials, new number plates.....$4.00
W.E. #202 Desk Handsets. F-1 handle. Complete with cords.....$8.50
"REBELCO" Handset conversion kits. F-1 handle, 4 cond. cord, cover plate and saddle....$7.50
NEW W.E. #110 Swbd. Plug, complete with NYLON 4 ft. 3 cond. cord. Red or Gray..$2.50
W.E. Handset handle with F-1 and HA-1 units, complete with cord.....$5.00
#706 Receivers. HA-1 unit in slip type shell, cord included.....$1.50
#635 Transmitter. F-1 unit in plastic front..$1.65

Factory method rebuilding of your Telephone equipment. Try us. Over forty years of service to the Independent.

REBUILT ELECTRIC EQUIPMENT CO.
1704 WEST 21st PLACE • CHICAGO, ILL.

FOR SALE
COMPLETE 700 LINE
CENTRAL OFFICE
WESTERN ELECTRIC
INCLUDES
7 EA. W.E. SWBD. 550C TOLL COUNTERS, ETC., ETC., ETC.

Everything to Put You in Telephone Business

All Accessories and Materials Latest Type W.E.

Sale By Inspection Only

PRICE FOR ALL $7500.00

TALLEN CO., INC.
159 Carlton Ave., Brooklyn 5, N. Y.

RECONDITIONED

Harmonic and Straight Line Ringers

Stromberg-Carlson #1212
Self-Contained Anti-Side Tone Manual or Dial Handsets

LARGE QUANTITY AVAILABLE AT LOW PRICES

Write for Circular 852-C

BUCKEYE TELEPHONE & SUPPLY COMPANY
1250 KINNEAR RD. COLUMBUS, OHIO KINGSWOOD 0655

PUT IT IN YOUR BACK POCKET.
IT DRILLS in **CONCRETE** holes up to 1 FT. deep. **UP** to **1 IN.** diam. **IT** is used **NATIONALLY** by **AMERICA'S BIG FIRMS.** Uses **YOUR** standard **TOOLS. IT** costs **ONLY $27.50. IT** is guaranteed.
Information on request.
HAMER-DRIL 512 Greenwich St. New York 13, N. Y.

Cable Splicer's Trailers
$150.00 each
NEALE CONSTRUCTION CO.
3100 Topeka Blvd. Topeka, Kans.

SMALL MAGNETO EXCHANGE in southern Michigan. Average number of subscribers 380. Manager's house and switchboard office combined. Material supplies building and garage combined—50 miles of wire—25,000 feet cable. Plant all in good shape. Reason for selling: stockholder's old age. Write Box 104, Allen, Mich.